WATER AND SEWAGE RECLAMATION PLANTS THAT PRODUCE WATER THAT WOULD BE SUITABLE AND AVAILABLE FOR USE IN CENTRAL VALLEY WILDLIFE REFUGES

Report to the Legislature as Required Under AB 4328

NOVEMBER 1991

STATE WATER RESOURCES CONTROL BOARD CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY



STATE OF CALIFORNIA Pete Wilson, Governor

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD CENTRAL VALLEY REGION

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EXECUTIVE SUMMARY

The wetlands and wildlife refuges in California Central Valley are a vital link in the integrity of the Pacific Flyway. Agricultural, urban and flood control development, however, has eliminated over 90 percent of the original 4 million acres of wetlands in the Valley. Many of the remaining wetlands are in critical need of water and most do not have a firm water supply in amounts sufficient to optimize wetland habitat. Expanding urban and agricultural activities coupled with a prolonged drought have increased competition for any remaining water supplies. Because of the critical shortage of water in the existing refuges, the legislature, through AB 4328 asked the State Water Resources Control Board to evaluate and report on "water and sewage reclamation plants whose water would be suitable and available for use in the Central Valley wildlife refuges." This report describes whether water from the reclamation facilities could be used as an alternative water supply for habitat.

There are currently 12 established sites statewide where municipal wastewater is used in wetland areas. Only one of these sites, the City of Merced, is in the Central Valley and only one site, in Southern California, is supplying water to an existing wildlife refuge. All 12 projects are relatively recent developments and provide only preliminary information on wastewater use on habitat.

Because of the limited experience, neither the U.S. Fish and Wildlife Service (USFWS) nor the California Department of Fish and Game (DFG) have an established policy on the use of reclaimed water in wildlife refuges. Both agencies, in correspondence to the Board, expressed concern that use of reclaimed water would degrade established habitat. Neither agency would accept the use of reclaimed water as a substitute for existing or planned freshwater supplies. Both agencies based their decision on the lower level of water quality having the potential to cause disease outbreaks or directly introduce diseases, and therefore, violate the Migratory Bird Treaty Act or the Endangered Species Act. In addition, the California Department of Health Services (DHS) is concerned with protecting public health, as well as ensuring vector control. DHS is in the process of revising Title 22 (CCR) to include a section on reclaimed water use in wetlands which focuses on water management for vector control. The vector control management proposed by DHS is likely to conflict with standard wetland habitat management practices.

Based upon the wildlife agencies' policies and DHS's concerns for public health protection, little municipal wastewater appears to be of suitable quality for long-term use in established Central Valley refuges.

Both USFWS and DFG did feel short-term emergency use during drought or other shortages may be viable. Because of this potential, a review was made of all treatment plants in close proximity to each of the 18 established refuges in the Central Valley that have wetland resources. Sixteen (16) municipal treatment plants were identified. Their combined flow is 9.7 million gallons per day (MGD) or 10,800 acre-feet of wastewater per year. This flow would represent only 2.8 percent of the water supply needed in the refuges (425,000 AF/yr). Preliminary estimates show that to upgrade their treatment processes

to secondary levels and build conveyances to the refuges, the capital cost alone would range from \$40-75 million for the 16 small communities. Roughly 60 percent of the wastewater flow would come from one treatment plant at the City of Merced. The City is currently developing its own wetland habitat, and its water may not be available for long-term supply. Based on current plans, no significant increase in available flow from the 16 facilities is expected by the year 2000.

The assessment conducted showed that the 16 municipal wastewater treatment plants represent an insignificant water source for existing Central Valley refuges. This conclusion is based on:

- a. the remote location of most existing refuges;
- b. the treatment plants near the refuges being small and having low flows;
- c. the fact that small communities would encounter a large cost burden to upgrade wastewater treatment facilities;
- d. the high conveyance costs associated with transporting the treated wastewater to the refuges; and
- e. DFG, USFWS and DHS policy discouraging such use in existing wildlife refuge lands.

Although both DFG and USFWS have a policy direction to not accept municipal wastewater on existing refuge wetlands, both agencies felt that such water had a high potential for use on facilities designed and managed specifically to accept such water. They stressed the need to create this habitat near or adjacent to the treatment facility. This would open up such use to all treatment plants regardless of their proximity to existing refuges and provide the waterfowl with sanctuary islands throughout the Valley.

To determine the interest and availability of water to create habitat near treatment plants, a review was made of all treatment plant records. Owners and operators of 756 treatment plants were asked to provide information describing their interest and abilities to create such habitat. Although not all of the plants are operating to capacity, 154 facilities represented greater than 95 percent of the available municipal wastewater flow in the valley. Analysis was concentrated on these facilities. The survey showed that of the 583 MGD (655,000 AF/yr) presently discharged by these 154 facilities, 34 percent of this water was already being reused. The primary reuse was on irrigated agriculture (88 percent of the water being reused). Only 1.8 percent (3.4 MGD or 3,800 AF/yr) was being used for wildlife habitat enhancement.

Eighty-eight of the 154 key facilities expressed interest in creating wildlife habitat. These 88 facilities represent 73 percent of the total water volume currently treated and produce 300 MGD (335,000 AF/yr) which is not already designated for another use. These plants noted 19,000 acres of land among them which could be utilized for wildlife enhancement. The present volume of water, however, may be capable of supporting twice that much wetland habitat.

Development of such habitat would need to be balanced against the 8,500 acres of ponds that are being utilized as part of the present treatment processes, most of which supports some level of wildlife use. In addition, these 88 facilities presently discharge approximately 288 MGD (320,000 AF/yr) of treated water to surface streams, providing the opportunity for riparian habitat, aquatic life enhancement as well as other downstream reuse such as irrigation. The majority of the small communities with design capacities less than 0.5 MGD were not interested in creating wetland habitat because of small flows and lack of suitable land.

Based on the responses from operators of Central Valley treatment plants, there is enough interest in creating wetland habitat with reclaimed water that it warrants the development of statewide policies or guidelines governing such beneficial use is warranted.

During the reclamation plant survey, owners and operators of the facilities repeatedly expressed concern over their potential liability for creating wetland habitat with treated wastewater. Both the operators of the facilities, as well as the Regional Board, must fully understand their individual responsibilities in managing and regulating, respectively, habitat created using treated wastewater. No guidelines currently exist. In California, habitat created using treated wastewater has been developed on a case-by-case basis. No overall policy governs management or regulation of the sites. No regulatory recourse has been determined should the reclaimed water be found to degrade habitat or promote avian disease or death. Before statewide policy can be prepared, a number of issues must be addressed. These include:

- a uniform definition of a wetland;
- determining whether "existing" and or "created" wetlands are waters of the State or navigable waters.
- determining if a "created" wetland that is part of a wastewater treatment process is considered a water of the state or a navigable water;
- 4. clarifying whether the objectives laid out in the Inland Surface Water Plan (SWRCB, 1991) or the Basin Plan (CVRWQCB, 1991) apply to "existing", "created", or "treatment" wetlands;
- determining whether the discharger can stop a discharge into an "existing", "created", or "treatment" wetland if another use for the water is found and if the cessation of discharge would be in violation of the California Department of Fish and Game Code or the new federal policy which states that there shall be no net loss of wetland acreage or habitat value; and
- the potential application of the Migratory Bird Treaty Act and the Endangered Species Act, should treated effluent discharged into a wetland or a wetland which is part of the treatment process, be found to cause or promote waterfowl disease or death.

INTRODUCTION

Wetlands and wildlife refuges in California's Central Valley are recognized nationally and internationally as the key link in maintaining the integrity of the Pacific Flyway: the main waterfowl migration route between Canada and Mexico. The Central Valley serves as critical wintering area for 90 percent of the waterfowl in the Pacific Flyway and over 60 percent of waterfowl nationwide (USFWS, 1990). The wetland complexes and associated uplands provide abundant ecological, social, and economic benefits. Wetland basins collect and store rainfall runoff, thus replenishing aquifers and groundwater supplies, prevent soil erosion, improve water quality through filtration and uptake of nutrients, and moderate impacts of flooding.

Since the late 1800's, the extent and character of these wetland and upland habitats have changed drastically. Although, historically, the Central Valley contained 4 million acres of permanent and seasonal wetlands; by 1939, only 14 percent (562,000 acres) remained; and by 1985, only 8 percent (319,000 acres) remained. The losses of wetlands have resulted in significant economic costs through the need to develop artificial flood control systems, the reductions in water quality, and the damages associated with flooding and erosion. In addition, it is estimated that half of the animal species and one-third of the plant species currently listed in the United States as endangered or threatened depend on wetlands for their survival (USFWS, 1990). With such extensive loss of historic wetlands, not only must California concentrate on acquiring wetland in its natural state, but also must focus on wetlands that have been modified and can be restored.

Most wetland loss has been associated with agricultural development and flood control activities that allowed expanded urban and agriculture development. The remaining wetland areas in the Central Valley are in a critical state due to urban and agricultural activities around them coupled with a prolonged drought that has increased competition for the available water supplies. This decrease in available water has been compounded in some areas by the loss of agricultural drainage as a water supply. This loss was due, in part, to the selenium contamination discovered in agricultural drainage water diverted to Kesterson Reservoir and later linked to waterfowl deaths. The drainage water loss is also associated with improved farm water management and the increased competition for the water being saved. In the past, agricultural drainage made up a significant portion of several wetland water supplies and there is a critical need to replace these water supplies if the remaining habitat is to be preserved and/or enhanced.

Concurrent with this critical need for water in the wetlands and wildlife refuges, cities and industries are facing increasing costs to treat and dispose of wastewater to meet new regulatory requirements. These new requirements include additional restrictions on disposal of the water into surface water. Many cities are looking at alternative ways to reuse or dispose of this water. Reclamation or reuse may be a key component in many future plans for the wastewater in the water short Central Valley. The State Water Resources Control Board (State Board) and the Central Valley Regional Water Quality Board (Regional Board) have promoted reclamation and reuse of wastewater through policies and regulatory actions.

The legislature recognized, through AB 4328, that one way to meet the water shortage in the Central Valley could be to promote greater use of reclaimed water in wetlands and wildlife refuges. AB 4328 requires the State Board to prepare a report to the legislature on "water and sewage reclamation plants whose water would be suitable and available for use in the Central Valley wildlife refuges". This report was prepared in fulfillment of that requirement.

The report is divided into six sections that focus on:

- --existing wastewater reuse in wetlands in California;
- --current study area description;
- --water suitable for use in established wildlife refuges based upon existing policies and water quality criteria;
- --reclaimed water available to enhance established wildlife habitat; and
- --potential to use reclaimed water to create new wildlife habitat;
- --legal liabilities of the owners and operators of treatment plants when using reclaimed water to create wildlife habitat.

EXISTING WASTEWATER REUSE IN WETLANDS

Part of the basis for the Assembly Bill 4328 was the positive results from pilot studies on reuse at a few wetland sites throughout California. In 1987, it was estimated that, statewide, municipal wastewater reuse for wetlands and for wildlife enhancement represented only 4 percent of the nearly quarter million acre-feet per year of reuse. In the Central Valley, where 45 percent of the total statewide reuse occurs, less than 1 percent of the reuse occurred on wetlands or for wildlife enhancement (SWRCB, 1990). The potential for increased use on wildlife habitat is very high, but must be done in a safe environment. Table 1 lists 12 municipal wastewater treatment plants in California which use reclaimed water to enhance wildlife habitat. The enhancement ranges from maintaining duck ponds for hunting to creating freshwater marshes. Most of these projects are situated along coastal areas.

The most successful and well-known projects are the freshwater marshes created by the Cities of Arcata and Eureka. In Arcata, wastewater is treated to secondary levels, disinfected, and discharged into the 30-acre Arcata Marsh Wildlife Sanctuary (AMWS) which consists of three marsh/ponds. After flowing through the AMWS, the effluent returns to the treatment plant for additional disinfection before discharge into Humboldt Bay. The disinfection limits on the discharge are based on both recreational uses of the area as well as the water standards for shellfish growing areas (Humboldt Bay harbors two-thirds of the commercial oyster beds in California). The AMWS is not designed as a treatment facility. The Arcata Wastewater Treatment Plant (WWTP) is providing a reliable source of freshwater to maintain the 30 acre marsh.

Table 1. Municipal Wastewater Treatment Plants in California which use Reclaimed Water to Enhance Wildlife Habitat (Adapted from SWRCB, 1990).

TRE	TREATMENT PLANT	NT				ANNUAL	WATER
		CAPACITY	FLOW	RECLAIMED		WATER	PRICE
NAME	PROCESS	(MGD)	(MGD)	WATER USER	TYPE OF USE	REUSES (AF)	\$ / AF
ALAMEDA COUNTY				EBRPD - Hayward			
EBDA - Hayward Marsh	PS,RB,AS CH	24.2	23	Shoreline Marsh	Wetlands Enhancement	1000-10000	•
CONTRA COSTA COUNTY				Mt. View SD Wetlands			
Mt. View SD WWTP	PS,TF,CII	1.7.1	1.54	Reclamation Project	Wetlands Enhancement	1768	•
HUMBOLDT COUNTY				Arcata Marsh and Wildlife	Freshwater Marsh		
Arcata WWTP, City of	PS,OP,CH,W	2.3	1.8	Sanctuary	Enhancement	1669	,
HUMBOLDT COUNTY	CH,DC					*	
Elk River WWTP	PC,SC,TF	32	32	Elk River WMA	Wetlands Enhancement		t
LOS ANGELES COUNTY					Wildlife Refuge		
Lancaster WRP (CSD)	PS,OP,C,F,CH	6.5	6.3	Piute Pond	Enhancement	5156	ļ
MARIN COUNTY					Marsh Ponds / Wetlands		
Las Gallinas SD	PS,RB,AS,CH	1.6	1.53	Las Gallinas Wetlands			,
MERCED COUNTY					Wetland / Wildlife		
Merced WTF, City of	PS,AS,D	10	7.29	Wetland/Wildlife Area	Enhancement	1008	•
ORANGE COUNTY							1
Michelson WRP (Irvine Ranch WD)	PS,AS,C,F,D	15	7	San Joaquin Duck Club	Duck ponds	601	ı
RIVERSIDE COUNTY				San Jacinto WMA	Wetland/Wildlife	<4500	\$15
Hemet / San Jacinto Reg WRF	PS,AS,D	7.5	7.3	Westra Ranch	Duck Ponds	850	•
(Eastern MWD)				Buena Vida Farms	Duck Ponds	841	
				Taber Duck Club	Duck Ponds	86	1
RIVERSIDE COUNTY	AS,CH,DC			Hidden Valley Wildlife		*	,
City of Riverside STP	DMF,PI,TF	32	32	Area	Wetland / Wildlife		
SAN DIEGO COUNTY							
City of Occanside	AS, C, F, PS	10.7	7.8	Whelan Lake	Wetlands Enhancement	50	ı
San Luis Rey Reclam. Fac.					Bird Sanctuary		2.43
SOLANO COUNTY	PS,TF,AS,C			Suisun Marsh Hunting	Maintenance of Hunting		
Fairfield-Suisun Subregional WWTP	F,CH,DC	17.5	12	Preserve	Marsh	172	•
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	and the same of the same	-1-21					

^{*} Cycles through wildlife area then back to treatment plant

^{**} Discharges through Hidden Valley Wildlife Area to Santa Ana River

SD = Sanitation District	TF = trickling filters	W = Wetlands	WD = Water District	WMA = Wildlife Management Area	WRF = Wastewater Reclamation Facility	WRP = Water Reclamation Plant	WWIP = Wastewater Treatment Plant
F = filtration	MWS = Municipal Water District	OP = oxidation ponds, including acrated la	PC = primary clarification	PI = polymer injection	PS = primary sedimentation	RB = rotating biological contactor	. SC = secondary clarification
AF = acre-foot	AS = activated sludge	C = coagulation/flocculation	CII = chlorination	CSD = County Sanitation District	D = disinfection	DC = dechlorination	DMF = dual media filtration

The City of Eureka is using its reclaimed water to maintain a 144-acre freshwater marsh as mitigation for habitat lost due to construction of its wastewater treatment plant (WWTP). The California Department of Fish and Game developed the habitat management plan for the area. The three management units are operated as seasonal marshes, and as such are flooded from October until mid-July. The water cycles through the marshes and is returned to a storage pond before being discharged into Humboldt Bay during ebb tide. Again, the water has undergone secondary treatment before being discharged into the marsh and is recycled through the WWTP before discharge to the ocean.

Both the Arcata and Eureka wildlife habitats are flow through systems with ultimate discharge to Humboldt Bay. The maintained marshes and ponds provide enhanced habitat and additional storage capacities during storm events but do not act as the key component of the wastewater treatment process.

The San Jacinto Wildlife Management Area (WMA), located 18 miles southeast of downtown Riverside, more closely delineates the type of habitat that could be created in the Central Valley of California. The land was initially purchased in 1982 to mitigate for habitat lost during the construction of the State Water Project; however, a water supply was not allocated. Since 1989, a tenmile pipeline has carried secondarily treated wastewater from the Hemet WWTP to the refuge with marked success in habitat enhancement. Resident and migratory waterfowl have settled on four ten-acre permanent ponds and the seasonal ponds in between. Some waterfowl are nesting in the area for the first time in 70 years. Riparian habitat has also been initiated, with willows and cottonwood growing eight to twelve feet per year. The California Department of Fish and Game manages the 4,700 acre refuge and has contracted with the Hemet WWTP to increase reclaimed water deliveries by 300 acre-feet per year until the necessary 4,500 acre-feet are available to maximize wetland habitat in the refuge.

Unique features about the San Jacinto WMA that make it a more appropriate example for Central Valley wetlands include the fact that the system does not have drainage to a large diluting body of water. The area's main drainage artery, the San Jacinto River, flows to Canyon Lake, which is used for drinking water. Therefore, reclaimed water can not be allowed to discharge into the San Jacinto River because of the downstream drinking water sources (State Environmental Health Code Section 60317). In addition, the area experiences limited rainfall in the winter and extremely high ambient air temperatures in the summer--both features common in the Central Valley while being rare along the coast.

STUDY AREA DESCRIPTION

The study area encompasses the Central Valley of California, which extends roughly 600 miles in a north-south direction, occupies about 40 percent of California (60,000 square miles) and is an important agricultural, mineral, recreational and wetland resource. The Valley is also one of the fastest population growth areas in California. The Valley is ringed by high mountains on both the east (Sierra and Cascade Mountains) and the west (Coast Ranges and Klamath Mountains) which have played a significant role in forming the valley floor, the principal wetland area. The valley floor extends over 400 miles in a north-south direction and has an average width of greater than 50 miles. It contains the bulk of the agricultural, urban and wetland resource.

Historically, a large percentage of the Valley floor was dominated by permanent and seasonal wetland habitat. In the late 1800's, over 4 million acres of wetland existed on the Valley floor. However, through flood control works and conversion of land to other uses, especially agriculture, wetlands now cover only about 319,000 acres or less than 10 percent of the original area (Figure 1)(USBR, 1989). Of the remaining wetland habitat in the Central Valley, only 18 percent (59,050 acres) is managed in ten National Wildlife Refuges and eight State Wildlife Management Areas. Fifty-six thousand acres is managed in the Grassland Resource Conservation District, a privately operated wetland complex (Figure 2). These areas have a water supply need of approximately 425,000 AF/yr to maximize the wetland areas under their control (USBR, 1989a). These managed wetland areas, however, are often in remote locations, far from municipal wastewater sources.

AB 4328 asks for a determination of the suitability and availability of water from municipal sewage treatment facilities that could be used in wildlife refuges in the Central Valley of California. There are 452 municipal sewage treatment facilities in the Central Valley having flows ranging from a few thousand gallons per day to over a hundred million gallons per day. These treatment plants discharge a total of 625,000 AF/yr of treated effluent. In addition, there are over 300 private wastewater treatment facilities, but their combined flows represent only about 7 percent of the flow produced by the publicly-owned facilities.

The Central Valley consists of three distinct areas: the Sacramento River Valley, the Delta Area, and the San Joaquin Valley. The northernmost, the Sacramento River Valley, contained wetlands in both its upper reaches and in the Valley floor portion. Wetlands in the upper reaches, the Northern Plateau, are centered in the Pit River drainage. In this drainage there are the Modoc National Wildlife Refuge near Alturas and the Ash Creek State Wildlife Management Area near Adin. Because of the remote nature of the Pit River drainage, little man-caused influences have impacted these refuge areas.

Historically, the Valley floor portion of the Sacramento River Valley contained extensive wetlands along both sides of the Sacramento River. Much of this area is now in rice production. There are five Federal and State wildlife refuges in this area with the greatest concentration near the towns of Willows, Colusa and Gridley. These five refuges make up the largest acreage of wetlands in the Central Valley under State and Federal control. Extensive private wetlands also exist in this area; and in addition, cooperative agreements permit seasonal flooding of some rice acreage, especially on land immediately adjacent to the refuges. Because of the rural and agricultural nature of the area, few large population centers exist within reasonable distance of these wetlands to allow transport of significant quantities of treated wastewater to the wetlands.

An extensive, continuous area of historical wetlands existed in the Yolo Basin and the Delta Area of the Central Valley. Today, most of these wetlands have been drained and the land is now in agricultural production. Only one State Wildlife Management Area exists within the Central Valley portion of the Yolo Basin-Delta estuary. Although the area is in intensive agricultural development, extensive urban areas also exist along the boundaries of both the Yolo Basin and the Delta. These urban areas include the cities of Sacramento, West Sacramento, Davis, Lodi, Stockton, Manteca, Tracy, Brentwood, Rio Vista,

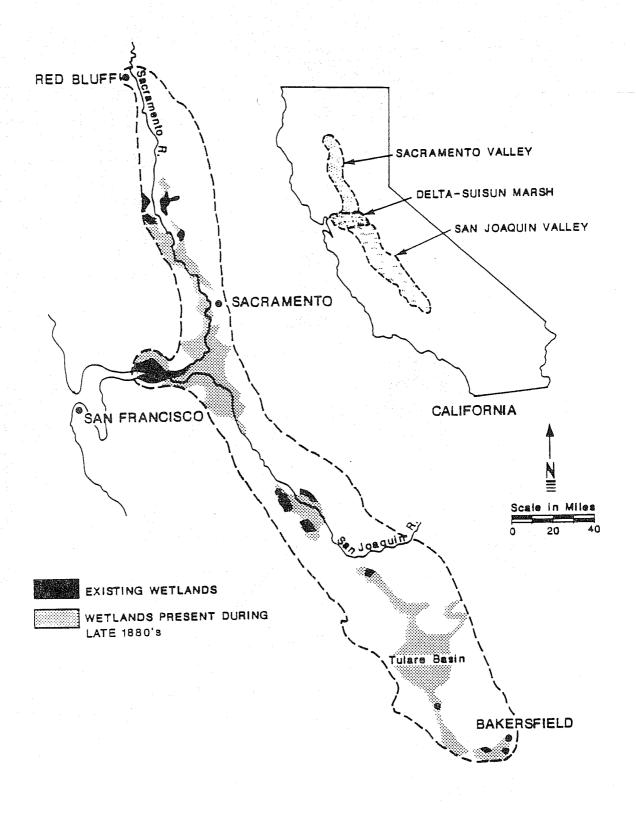


Figure 1
CURRENT DISTRIBUTION OF WETLANDS
COMPARED WITH LATE 1880'S

(Taken from USBR, 1989)

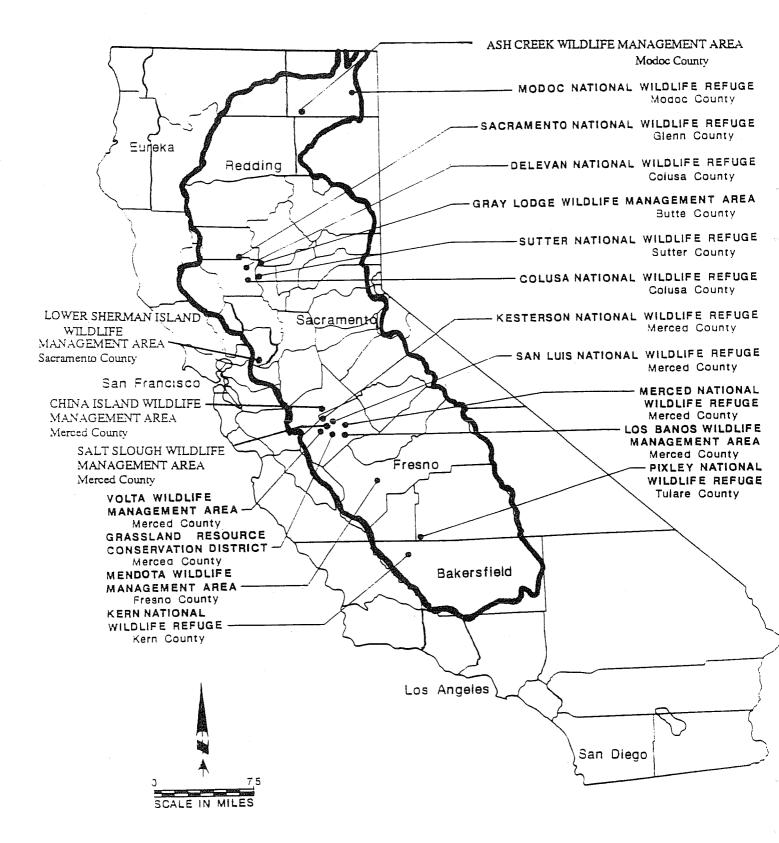


Figure 2.
STUDY AREA AND REFUGE LOCATION MAP

(Adapted from USBR,1989)

Antioch and several other smaller cities. The greatest potential for wetland development exists in this area because of the large quantities of wastewater available from these urban areas and the proximity of these discharges to available land with high potential for wetlands development.

The San Joaquin Valley is uniquely different from the Delta and Sacramento Valley. In addition to having lower annual rainfall, the San Joaquin Valley is actually two separate hydrologic areas. The northern portion (north of the San Joaquin River near Fresno) drains north toward the Delta and the San Francisco Bay. The southern portion of the San Joaquin Valley, commonly called the Tulare Lake Basin, is hydrologically closed except for occasional large flood flows, that drain north into the San Joaquin River and ultimately the San Francisco Bay.

Historically, the northern portion of the San Joaquin Valley contained only one area of wetlands which is known today as the Grassland Area. The Grassland Area is the largest continuous area of wetlands presently existing in the Central Valley. Three Federal- and two State-managed wildlife areas are found in this one area. In addition, two new State-managed areas have been acquired and are being developed. Even though there are now seven public refuges in the Grassland Area, their acreage represents only 20 percent of the wetlands in the Grassland Area. The remaining acreage is privately managed wetlands, most of which occurs in the Grassland Resource Conservation District. Many of these private lands have federal or state easements, through which development of the land for alternative uses would be severely The lands surrounding the Grassland Basin are primarily restricted. agricultural and some of this land has an elevated level of selenium which was associated with waterfowl death at the Kesterson National Wildlife Refuge within the Grassland Area. Because the economic base is primarily agricultural, few urban centers exist. Cities in the Grassland Area include Dos Palos, Los Banos, Gustine, Newman and Merced. Wastewater flows from these could be a source of water for wetland areas.

The hydrologically closed Tulare Lake Basin historically contained extensive seasonal wetland areas. The extent of these wetlands changed seasonally and yearly depending upon rainfall. The major portion of the Tulare Lake Basin wetland areas receive only 5-10 inches of precipitation compared to the 15-25 inches in the Sacramento Valley. The historical wetlands in the Tulare Lake Basin developed as a result of flood, and snow-melt flows from the Sierra Nevada, and therefore, the wetland areas were centered in the basin trough especially in or near the Goose Lake, Buena Vista Lake and Tulare Lake Beds. Most of the Sierra streams have now been controlled for agricultural water supply and the former lake beds drained and converted to agricultural lands. Three Federal- and State-managed refuges exist in the Tulare Lake Basin. The largest, Mendota Wildlife Management Area, makes up over 88 percent of the remaining wetland area in the Tulare Lake Basin. It is near the northern boundary of the basin and could be considered part of the Grassland Basin complex. The remaining two refuges are in remote areas surrounded almost entirely by agricultural land. Few private wetlands exist in the lower part of the basin because of the scarcity and cost of water. Few urban areas exist near these wetland areas.

The U.S. Fish and Wildlife Service considers the Central Valley wetland habitat one of the four most important in the United States . As of March 1989, however, only 7 of these 18 Federal and State Wetland refuges in the Central Valley had a firm water supply and only the Mendota WMA and the Modoc NWR had a firm supply sufficient for proper management of existing wetlands and facilities. The remaining refuges depend on available surface water, ground water, and agricultural return flows for supply. All of the currently available water supplies are diminishing, especially those from agriculture. As new efforts at water conservation are implemented, fewer return flows from agriculture will be available. New sources of freshwater, including reclaimed water of suitable quality, need to be considered for refuges if they are to be managed to their full potential. The existing water deliveries and supplemental water needs for each refuge are presented in Table 2.

WATER SUITABILITY FOR WILDLIFE HABITAT

As described in Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California (USBR, 1989), the 18 Federal and State refuges within the study area are seriously water short. With such drastic shortages in their current firm water supply, both the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (DFG), must find alternative firm water supplies to maximize their habitat use. In seeking any new water supply, whether freshwater or reclaimed municipal or agricultural water, both agencies must consider existing policies on such use, and in the case of municipal wastewater, water quality concerns must be carefully reviewed.

Existing Policies and Concerns by Public Wetlands Managers and Public Health Officials

Neither the USFWS or the DFG has an established policy on the use of reclaimed water in existing refuges. Both agencies raise serious concerns, however, that the use of reclaimed water would degrade established habitat.

DFG is concerned with the potential for bioaccumulation of low level toxicants and a gradual degradation of established habitat. In correspondence with the Regional Board, DFG felt that "use of reclaimed water to augment an existing supply or used conjunctively during periods of water shortages may be appropriate" but felt that for long-term use, the agency "would not accept the use of reclaimed water of lesser quality as a substitute for existing supplies on existing (refuge) wetlands" (Appendix B). It is the feeling of DFG that almost all refuges under their control will receive an adequate firm water supply from existing negotiations, thus reclaimed water would only be considered as a substitute supply during periods of drought. Such a policy would be very difficult for a wastewater treatment plant to operate under since municipal flow is relatively constant year round. In order to utilize the water on an "as needed" basis, the treatment plant would need a dual discharge system and be within reasonable distance of the refuge. This policy on limiting use of reclaimed water is in contrast to the existing use being made of municipal wastewater in the DFG-managed San Jacinto Wildlife Management Area (WMA). Water reuse at the San Jacinto WMA could serve as a learning tool for others as well as lead to the basis for a change in DFG's policy regarding such use in the Central Valley.

Table 2. Existing Water Deliveries and Supplimental Water Needs for Established Wildlife Refuges, Central Valley, California (Adapted from USFWS, 1989 AND USBR, 1989a).

-								1 1 1 1	
Refuse		Астеавс*	Level 1 (ac-ft)	Level 2 (ac-ft)	Level 3 (ac-ft)	Level 4 (ac-ft)	Needed St (firm supply) (ac-ft)	Needed Supply Based on supply) (current deliveries) ac-ft) (ac-ft)	ics)
NORTHERN AREA Modoc NWR		6181	18550	18550	19500	20550	2000	2000	
Ash Creek WMA		ND	Q.	Q	ON	QN	Q	QN	
	SUBTOTAL:	6181	18550	18550	19500	20550	2000	2000	
SACRAMENTO VALLEY Sacramento NWR		7147	0	46400	50000	50000	50000	3600	
Delevan NWK Colusa NWR		3380 3356	00	25000	25000	25000	25000	0	
Sutter NWR Gray Lodge WMA		1985 8400	0008	23500 35400	30000 41000	30000	36000	8600	
	SUBTOTAL:	24868	8000	151250	171000	179000	144000	27750	
DELTA - YOLO BASIN Lower Sherman Island WMA	d WMA	3100	ND	QN N	QN.	QN	QN	QX	
	SUBTOTAL:	3100							
NORTHERN SAN JOAQUIN VALI Grassland RCD Volta WMA	VALLEY	56000	50000	125000	180000	180000	130000	0009	
Los Banos WMA Kesterson NWR		3208 497	6200 3500	16670 3500	22500 10000	25000	18800 65000	8330	
San Luis NWR Merced NWR		3030	0 0 0	13350 13500	19000 16000	19000 16000	19000 16000 10030	2500 ND	
Salt Slough WMA China Island WMA		1120	0	22	22	28	10450	SS	
	SUBTOTAL:	68661	78591	182020	260500	266000	275270	93980	
TULARE BASIN Mendota WMA Biston WWP		9440	25463	18500	24000	29650	4187	11150	
Kem NWR		2800	0	9950	15050	25000	25000	15050	
	SUBTOTAL:	12240	25463	29730	42050	05909	35187	30920	
	TOTAL	115050	130604	381550	493050	526200	424957	154650	

ND=No data

*Currently managed as wetland habitat

Water Supply Level 1: Existing firm water supply

Water Supply Level 2: Current average annual water deliveries Water Supply Level 3: Full use of existing development Water Supply Level 4: Optimum management

The USFWS expressed similar concerns to those of DFG regarding use of reclaimed water in their refuge lands. In correspondence with the Board, USFWS stated that "the use of reclaimed water in refuges and other wetlands . . . should not be viewed, now or in the future, as a replacement for existing fresh water supplies. Also wetlands proposed as mitigation for projects which result in the loss of existing wetlands should not be established with reclaimed water as the sole or predominant water supply" (Appendix B). The USFWS felt, as did DFG, that all their existing refuge land would receive adequate fresh water supplies through new contracts with the Federal Central Valley Project. Thus reclaimed water would only be viewed as an emergency substitute supply during drought periods rather than a firm long-term water supply.

In addition to their concern for the long-term use of reclaimed water in established refuges, the USFWS expressed concern that there was a high potential for reclaimed water to create water quality conditions conducive to disease outbreaks. They cited recent experiences at the Modesto and Los Banos wastewater treatment facilities which resulted in the loss of over 6,000 waterfowl. They did not feel that the reclaimed water transmitted the disease, rather that the water created conditions conducive to the disease outbreaks. The USFWS is concerned that effluents may be responsible for such water quality conditions developing, and cite several suspected occurrences. They feel that because of the complicated nature of the disease development, "biologically safe levels of the components in sewage effluents can not be established" (Friend, 1982).

Because of a lack of experience in using municipal wastewater in wetlands, staff of the USFWS National Wildlife Health Laboratory warn that a potential exists for the direct introduction of diseases (Friend, 1982). Friend believes this potential is highest with municipal wastewater discharges containing agricultural waste from poultry processing plants or other types of animal industries.

Whether by direct introduction of diseases or by creating water quality conditions conducive to disease outbreaks, the cause may become the municipal effluent discharge. If such effluent is being discharged into a Federal or State wildlife refuge area, the applicability of two laws must be considered: The Migratory Bird Treaty Act; and The Endangered Species Act. As with the discharge of agricultural drainage water containing selenium into the Kesterson National Wildlife Refuge and resulting waterfowl deaths, an analogy could be found with a municipal effluent discharged into a refuge causing or promoting waterfowl disease or death. The Kesterson occurrence was viewed as a violation of the Migratory Bird Treaty Act because it was an unlawful "take" of waterfowl. A similar view could be taken for any damage caused by municipal wastewater.

A similar concern exists for a potential violation of the Endangered Species Act. Interim guidelines developed by the National Wildlife Health Laboratory call for a prohibition of discharge of municipal wastewater to National Wildlife Refuges whose wetlands are frequently utilized by endangered species (Friend, 1982). This guideline is especially critical as it is estimated that half of the animals and one-third of the plant species currently listed in the United States as endangered or threatened depend on wetlands for their survival (USWFS, 1990). Although these are national figures, the extensive

loss of wetlands in the Central Valley suggests that the percentage of species in California may be even higher. If a discharge of municipal wastewater to a wetland did cause a damage to wildlife, either directly or indirectly, that discharge could be viewed as a violation of the Endangered Species Act.

A large block of the wetlands in the Central Valley have always been seasonal wetlands. These areas have a unique value, and the wetland and wildlife values in the refuges may change if these areas are converted to perennial wetlands by use of reclaimed water. The USFWS feels that "the use, availability and control of reclaimed water should be at the discretion of a knowledgeable wildlife manager so that habitat management needs rather than (wastewater) disposal needs drive the application of water to wetlands" (Appendix B).

Managing wastewater in wetlands based on habitat needs may not be consistent with the draft regulations of the California Department of Health Services (DHS) (Appendix B). DHS has concerns that wastewater discharged into wetlands is managed in a manner that protects public health from varying degrees of contact as well as to ensure vector control. DHS does not have an existing policy on the use of wastewater in wetlands but they are in the process of revising Title 22 of the California Code of Regulations to include a section on wetlands. The initial drafts of the revision focus on the need for water management to control mosquito and other vector populations. requirements stress the need for a "fully oxidized wastewater free of chemical pollutants." The draft regulations focus on vector control because DHS's experience in wetland situations has not been a positive one. For example, DHS prohibits the use of reclaimed municipal wastewater for rice production in the lower San Joaquin Valley because of the production of the encephalitiscarrying mosquito. In addition, most mosquito abatement districts prohibit growth of weeds or other aquatic plants in areas where wastewater is ponded because of vector problems. These experiences are carried forward in the draft regulations which stress "a minimum constant water depth of three feet; fluctuating water depth to control mosquito breeding; water must not stand for more than three days; and the levees must be steeply sloped". These conditions would be difficult, at best, to meet in any of the established refuges and would likely result in a poor quality habitat, perhaps no better than that already produced at wastewater treatment plants featuring large oxidation-stabilization-evaporation ponds.

The Regional Board does not have a defined policy for discharges of reclaimed water to wetland areas. The Porter-Cologne Water Quality Control Act and the Federal Clean Water Act define established wetlands as waters of the State and Nation. Discharges to these water bodies would be regulated by a discharge permit issued under the National Pollutant Discharge Elimination System (NPDES Permit). The NPDES permit would describe or define the effluent limits or the receiving water standards that would have to be met by any discharge. These limits would be consistent with Board policy as described in the Basin Plan of the Region, the Inland Surface Waters Plan, or other state-wide plans and policies that may be available. A more in-depth discussion of water quality guidelines is described in the next section.

Water Quality Guidelines for Wetland Areas

Water quality of both the discharge and the wetland area are key elements of a successful reuse project. To help determine the appropriate discharge limitations and wetland water quality, a survey was made of all applicable agency standards.

The DFG does not have water quality guidelines for water or reclaimed water used in established refuges and wetlands or on new wildlife habitat including wetlands. (DFG recognizes the need for such guidelines, especially in constructed wetlands or where conjunctive use may be proposed. DFG has reviewed a proposal to begin development of such guidelines [Appendix C]).

The USFWS has not developed water quality guidelines for water, reclaimed water or other alternative water supplies used in established refuges and wetlands. The USFWS does, however, have an internal policy for selenium of <2 $\mu \mathrm{g}/\mathrm{l}$ for use of water in federal refuges and easement areas. This policy was established after the recent experiences with selenium damage at Kesterson National Wildlife Refuge.

Because selenium in agricultural drainage water caused waterfowl death at Kesterson Reservoir, the California Legislature, through the Governor's 1985-86 budget, provided funding for an intensive look at municipal discharges for selenium. Selenium samples were taken from 75 municipalities in the Central Valley, the majority of whose discharges eventually find their way into the Sacramento-San Joaquin Rivers and Delta. Only one of these discharges, that from the City of Davis, showed selenium in levels above the USFWS guideline of 2 $\mu \mathrm{g}/\mathrm{l}$ (Westcot and Gonzalez, 1988).

The USFWS has expressed concern for the toxic effects of chemicals found in some wastewaters. In correspondence to the Board, the USFWS states that "The most conservative criteria for protection of aquatic life using site specific bioassays should be employed, because EPA guidance criteria alone may not be sufficient to protect all aquatic organisms within a given wetland." Additional guidance is also available through the USFWS Contaminant Hazard Reviews. These reviews, although not official policy of the USFWS, serve as an additional reference source for developing site specific objectives (USFWS, 1989).

The DHS draft regulations under Title 22 do not have specific water quality criteria except for public health protection, where the wastewater must be disinfected such that coliform organisms do not exceed 2.2 per 100 milliliters. Achieving this level of disinfection would require at least secondary treatment, and in some instances, advanced secondary or tertiary treatment. The regulations also state that the wastewater is to be "oxidized wastewater" and discharge should be free of any "organically-enriched effluent or (effluent) with other chemical pollutants." None of these terms are defined as of today.

All discharges to wetlands in established refuges will be regulated under the provisions of the Porter-Cologne Water Quality Control Act and the Federal Clean Water Act. Other important regulatory documents are the Water Quality Control Plan (Basin Plan) and the California Inland Surface Waters Plan (ISWP). The Basin Plan outlines the policies and mechanisms for water quality

protection in each basin. The ISWP outlines the water quality objectives for all surface waters in the State including established wetlands in the Federal and State refuges. The water quality objectives from the plan are shown in Appendix D. This Plan incorporates the latest water quality criteria specified by the U.S. Environmental Protection Agency (EPA). Appendix D also shows the latest EPA water quality criteria for ammonia, which would be applicable to discharges into established refuges. At present, the policy outlined in the ISWP on discharges to wetlands constructed to receive reclaimed wastewater would have the wetlands classified as "effluentdominated" water bodies whose beneficial uses are established as a result of the wastewater discharge. Constructed wetlands which support beneficial uses as a result of the discharge of reclaimed water are considered "Category A" water bodies as defined by the Inland Surface Water Plan (SWRCB, 1991). If site specific objectives have not been adopted for Category A water bodies by April 1997, The water quality objectives in Appendix D shall apply to that water body. At present, there is no policy on discharges to wetlands that are considered part of the wastewater treatment process.

AVAILABILITY OF RECLAIMED WATER FROM WASTEWATER TREATMENT PLANTS FOR USE IN CENTRAL VALLEY REFUGES

The recent water supply report for the Central Valley federal and state refuges (USBR, 1989) is the master plan for developing a firm water supply to utilize the habitat in existing refuges to its full potential. The USBR did not consider water from municipal wastewater facilities as a potential water supply. Present policy of both USFWS and DFG would also discourage use of municipal wastewater as a substitute for the identified amounts of freshwater needed to optimize this habitat. Based upon this policy and the concerns of DHS for public health protection, little municipal wastewater appears to be of a quality suitable for long-term use in established Central Valley refuges. Use, however, may be made in emergency situations, especially during drought. As the refuges do not currently contract with wastewater treatment facilities for emergency supply, they would have to compete for this water with other potential users, such as farmers.

Because of the potential for short-term use, a review was made of the availability of water from treatment plants in close proximity to each of the 18 established federal and state refuges in the Central Valley that have wetland resources. This review was done assuming a need for the water and that the water would be available.

The site-by-site analysis of each of the 18 federal and state refuges and potential municipal wastewater supplies is summarized in Appendix E. Table 3 presents the list of the municipal facilities considered based on their close proximity to the established wildlife refuges. In many instances using the wastewater would require a separate conveyance system to transport the water to the refuge.

The volume of wastewater currently available from each of the 16 communities in close proximity to the refuges is also listed in Table 3. The total available water is 9.7 MGD or approximately 10,800 AF/yr which represent only about 2.8 percent of the needed water supply for the refuges. Of this available supply, almost 60 percent would come from one treatment facility at

Table 3. Municipal Facilities in Close Proximity to Established Wildlife Refuges and Wastewater Available to Augment Refuge Water Supply.

						Municipal Facili	Municipal Facilities in Close Proximity to Refuge	mity to Refuge			
Area Refuge	Water Supply (AF/yr) Contracted Neede	Ai'/yr) Needed*	Facility	Proximity (miles)	Treatment Level	Design Capacity	Volume MGD (AF/yr) Current Flow Current R	ID (AF/yr) Current Reuse	Available Water	Expected Increase by year 2000	Ponds (acres)
SACRAMENTO VALLEY						·					
Northern Plateau											
Modoc NWR Ash Creek WMA	18550 ND	2000 ND	Alturas Adin	adjacent adjacent	7 7	0.5 (550) 0.055 (61)	0.5 (550)	0 0	0.5 (550)	0 0	0 %
Sacramento River Valley								,			
Sacramento NWR	0	20000	Willows	10	2	1.12 (1250)	1.12 (1250)	0	1.12 (1250)	0	17
Delevan NWR Colusa NWR	0 0	30000	Maxwell	8 0 5	2 0	0.2 (220)	0.07 (78)	0 0	0.07 (78)	0 0	6
	,		Williams	4	2 7	0.5 (550)	0.35 (390)	0	0.35 (390)	3.0 (3350)	01
Sutter NWR Greylodge WMA	0008	3000	(isolated location) Gridley	10	2	0.8 (890)	0.8 (890)	0.8 (890)	0	. 0	æ
DELTA-YOLO BASIN											
Lower Sherman Island WMA	0	0	(isolated location)								
SAN JOAQUIN VALLEY											
Northern Area											
Grassland RCD	20000	130000	Newman	4	2	1.2 (1320)	0.6 (670)	1.1 (1230)	0	0	100
			Gustine	2	7	1.2 (1320)	1 (1100)	1 (1100)	0	0	. 59
			Los Banos Dos Palos	e 6	2 2	2.5 (2790)	2 (2200)	2 (2200) 0	0.5 (550)	1.0 (1100)	300
Volta WMA	10000	0009	Santa Nella	1 4	7	0.45 0	0.2 (220)	0.2 (220)	0	0	<u> </u>
Los Banos WMA	6200	18800	Los Banos	33	7	(see above)					
Kesterson NWR	3200	0059	Newman	4 r	2 6	(see above)					
San Luis NWR	0	19000	(isolated location)	1	1						
Salt Slough WMA China Island WMA	8891	10020 CIN	(isolated location)	2	2	(see ahove)					
	•	<u> </u>	Newman	adjacent	2 .	(see above)					
Merced NWR	0	16000	Merced	, 6	2	10 (11200)	7.3 (8150)	1.4 (1560)	5.9 (6590)	3.0 (3350)	400
Tulare Lake Bed											
Mendota NWR	25463	4187	Mendota	3	7	1.2 (1320)	1 (1100)	1 (1100)	0		7
Pixley NWR	0	0009	Earliman	en 1	7	0.6 (670)	0.6 (670)	0	0.6 (670)		30
Kem NWR	0	25000	Pixley (isolated location)	n N	7	0.7 (770)	0.7 (770)	0.1 (110)	0.1 (110)		4
TOTALS:	121713	377487				22 (24600)	16.8 (18800)	7.1 (7930)	9.7 (10800)	7.0 (7850)	1023
 	to optimize habitat										

*additional water supply necessary to optimize habitat
Treatment Levels: 2 = secondary: the treatment of wastewater by biological methods (ie. oxidations ponds, activated sludge, etc.) after primary treatment

the City of Merced. If we assume the City of Merced's flow is utilized, the remaining 15 municipal wastewater facilities would be capable of supplying less than one percent of the needed water supply for the refuges.

A preliminary estimate of capital cost associated with upgrading the 16 wastewater treatment plants to meet secondary treatment and disinfection, as well as with conveying their water to the refuge, was conducted (CVRWQCB). The estimate shows that the 16 small communities would need to spend from \$40-70 million to upgrade their present treatment processes and to build conveyance structures. The treatment plant upgrades would allow the wastewater to be discharged directly into the refuges. The conveyance system costs were calculated upon the present or future available flows and the approximate distance the wastewater would need to be conveyed to the refuge. These costs only reflect the capital costs and not the operation and maintenance of the systems which could easily double the costs. In addition, the costs were calculated on the present daily flow and not periodic large volumes of water over short periods of time.

Based on applications to renew Waste Discharge Requirements, the available flow is expected to increase by 7.0 MGD (7,850 AF/yr) by the year 2000. This increase in flow would represent less than 2 percent of the needed water supply if the increase were spread uniformly across the valley. This increase, however, is expected to occur at only three of the treatment plants, the cities of Merced, Williams and Los Banos.

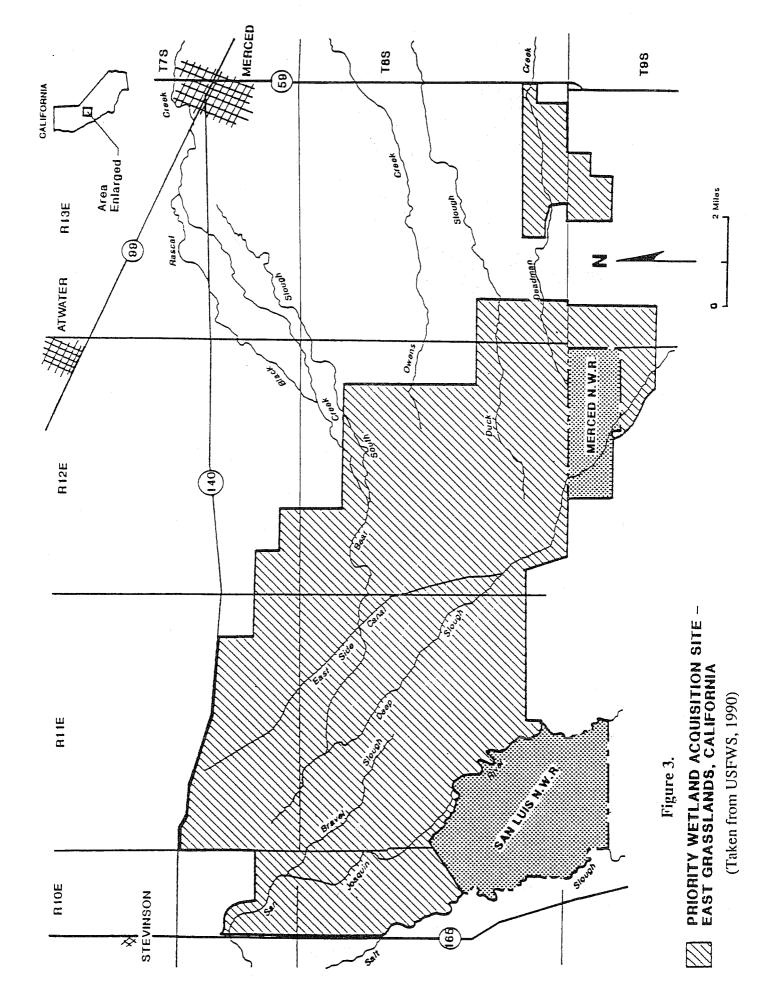
From the data presented in this assessment, water from municipal wastewater treatment plants appears to represent an insignificant water source for meeting the existing water needs in both the established federal and state refuges in the Central Valley, as well as in the privately owned Grassland Resource Conservation District. This conclusion is based upon:

- a. the remote locations of the existing federal and state refuges that would require long conveyance systems to provide water to the refuges. The exceptions would be of the Cities of Willows and Alturas which discharge into waterways that could immediately serve as supply sources;
- b. the treatment plants near the refuges are small and their available flow would represent less than 3 percent of the existing refuge water supply needs;
- c. low flow necessitating the facilities to store the water so that use could be made during the time the wetlands are flooded although water exchanges could help alleviate this need;
- d. a large cost burden which would be placed on small rural communities as most of these communities would require upgraded wastewater treatment facilities in order to meet water quality and public health requirements; and
- e. USFWS and DFG policy discouraging such use in existing wildlife refuge lands.

POTENTIAL FOR CREATING ALTERNATE HABITAT

Policy constraints, concerns as to the degradation of established habitat, and lack of major municipal treatment facilities in close proximity to established refuges, severely limit possible use of reclaimed water on established wildlife refuges in the Central Valley of California. The potential does exist, however, to create new, localized and isolated habitat, designed and managed specifically to utilize reclaimed water, in the vicinity of wastewater treatment facilities. This approach is consistent with policy direction provided to us by the California Department of Fish and Game (DFG). Although DFG ". .would not accept the use of reclaimed water of lessor quality as substitute for existing supplies on existing wetlands", the agency did note that ". .for new or restored wetlands, the use of reclaimed water has considerable potential and [DFG believes] it to be good policy to explore that potential" (Appendix B). Both wildlife protection agencies, DFG and the U.S. Fish and Wildlife Service, raise serious concerns with the use of reclaimed water degrading established refuges and appear to prefer using reclaimed water on facilities designed and managed specifically to accept such water. Add to that sentiment the fact that the maximum amount of reclaimed water currently available to the established refuges by nearby municipalities is only 2.8 percent of the projected demand to optimized habitat (Table 3), and creation of alternate habitat becomes a more realistic option.

Due to the extensive loss of wetland habitat in the Central Valley of California, a number of public and private organizations are in the process of investigating and ranking land areas for acquisition and later conversion to wildlife habitat. The U.S. Fish and Wildlife Service has published two documents delineating these priority areas; the Regional Wetlands Concept Plan, Emergency Wetlands Resources Act (USFWS, 1990) and Environmental Assessment: Proposed North Central Valley Wildlife Management Area (Strong, 1991). The Regional Wetlands Concept Plan was prepared in accordance with the Federal Emergency Wetlands Resources Act of 1986. The purpose of the plan is to identify priority acquisition sites based on wetland functions, values, and threats specific to the Service's Pacific Coast Region which includes California, Hawaii, Idaho, Nevada, Oregon, the Pacific Islands, and Washington. Two sites were identified in the Central Valley of California and placed on the priority acquisition list and, therefore, made eligible for Land and Water Conservation Funds. The two sites are 36,550 acres in the East Grasslands area of Merced County (Figure 3) and 8,000 acres in Sacramento and Solano County known as the Stone Lakes area (Figure 4). Two municipalities, Merced and Atwater, are located near the East Grasslands acquisition area. These cities produce a total of 10 MGD (11,200 AF/yr) of treated wastewater which may be available for the new area (Table 4). The main facility in the vicinity of the Stone Lakes acquisition site is Sacramento Regional County Sanitation District. This plant is currently discharging 160 MGD (approximately 180,000 AF/yr) of treated wastewater into the Sacramento River. Sacramento Regional is also presently conducting a 20 acre demonstration wetland project using their water as the supply. The two other municipalities in the vicinity of Stone Lakes, Franklin and Hood, are very small and utilize septic tank systems.



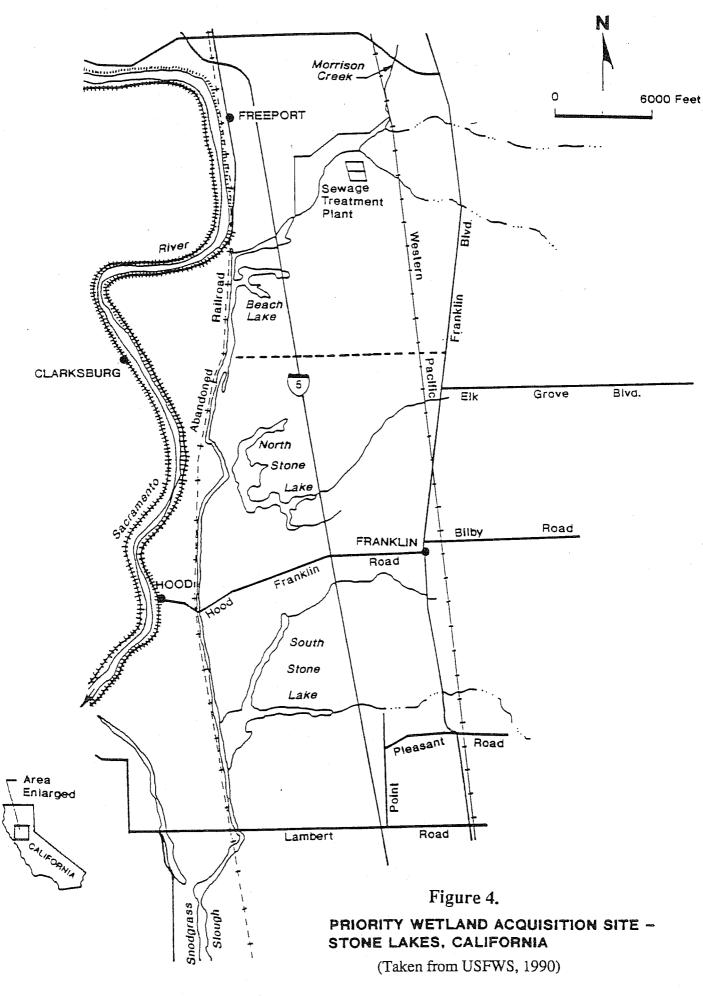


Table 4. Municipal Facilities in Close Proximity to Principal Wetland Acquisition and Wastewater Available to Augment Water Supplies.

			Munic	Municipal Facilities in Close Proximity to Proposed Wildlife Areas	ose Proximity to I	Proposed Wildlife	Arcas		
					>	Volume MGD (AF/yr)	'yr)		Ponds
U.S. Fish and Wildlife Service Priority Acquisition Area	Facility	Proximity Treatment (miles) Level	Treatment Level	Design Capacity	Current Flow	Current Reuse	roximity Treatment Expected Increase (miles) Level Design Capacity Current Flow Current Reuse Available Water by year 2000	Expected Increase by year 2000	(acres)
East Grasslands, Merced County	Merced	5	2	10 (11200)	7.3 (8150)	1.4 (1560)	5.9 (6590)	3.0 (3350)	400
	Atwater	4	2	4.9 (5470)	3.4 (3800)	0.003 (3)	3.397 (3800)	N Q	0
Stone Lakes, Sacramento County	Sacramento Regional County Sanitation District		2+	181 (202000)	160 (179000)	0	160 (179000)	N	0
	. , , , , , , , , , , , , , , , , , , ,		TOTALS:	TOTALS: 196 (219000)	171 (191000)	1.4 (1560)	169 (189000)	3.0 (3350)	400

Treatment Levels: 2 = secondary: the treatment of wastewater by biological methods (ie. oxidations ponds, activated sludge, etc.) after primary treatment *additional water supply necessary to optimize habitat

Table 5. Central Valley Habitat Joint Venture Acquisition Objectives (adapted from Strong, 1991).

	Land Acquis	sition (acres)	Wetland Pro	tection (acres)	
County	Fee Title	Easement	Existing	Restored	Acres
					:
Tehama	0	2500	. 0	2500	2500
Glenn	0	7000	750	6250	7000
Butte	4640	14360	4500	14500	19000
Colusa	1200	6000	750	6450	7200
Sutter	5250	11750	500	16500	17000
Yuba	0	5000	2000	3000	5000
Placer	0	1000	0	1000	1000
Yolo	4575	15500	5000	15075	20075
Sacramento*	7175	9825	2300	14700	17000
Solano	0	2500	700	1800	2500
Contra Costa	0	1000	0	1000	1000
San Joaquin	0	4000	0	4000	4000
Total:	22840	80435	16500	86775	103275
Proposed Service Project:	6250	48750	8500	46500	55000

^{*} Although Sacramento County is within the boundaries of the proposed Wildlife Management Area no acquisition is proposed in the Sacramento County as a part of this project. The Joint Venture habitat objectives for Sacramento County would be met by acquisition by other Joint Venture participants and by the Service's Stone Lakes National Wildlife Refuge acquisition proposal which is being addressed under a separate environmental document.

The Proposed North Central Valley Wildlife Management Area (Strong, 1991) was prepared as a component of the Central Valley Habitat Joint Venture, a group of private organizations and public agencies that have agreed to pool their resources to solve habitat problems in the Central Valley of California. of the key strategies to the Joint Venture Plan is that ". . . the preferred location of new wetland management areas and sanctuaries should be an adequate distance from existing sanctuaries to optimize waterfowl use of surrounding agricultural food resources and to stimulate nearby private wetland development" (Strong, 1991). The Joint Venture Plan identifies over 103,000 acres within the northern Central Valley (north of the Stanislaus-San Joaquin County line) which should be acquired and/or restored to preserve important remaining wetland habitat for migratory waterfowl and other wetland dependant wildlife and plants (Table 5). Figure 5 depicts the Joint Venture's primary acquisition areas. The proposed areas are so widespread that almost any municipality within the northern Valley basin has some potential to contribute as a water source.

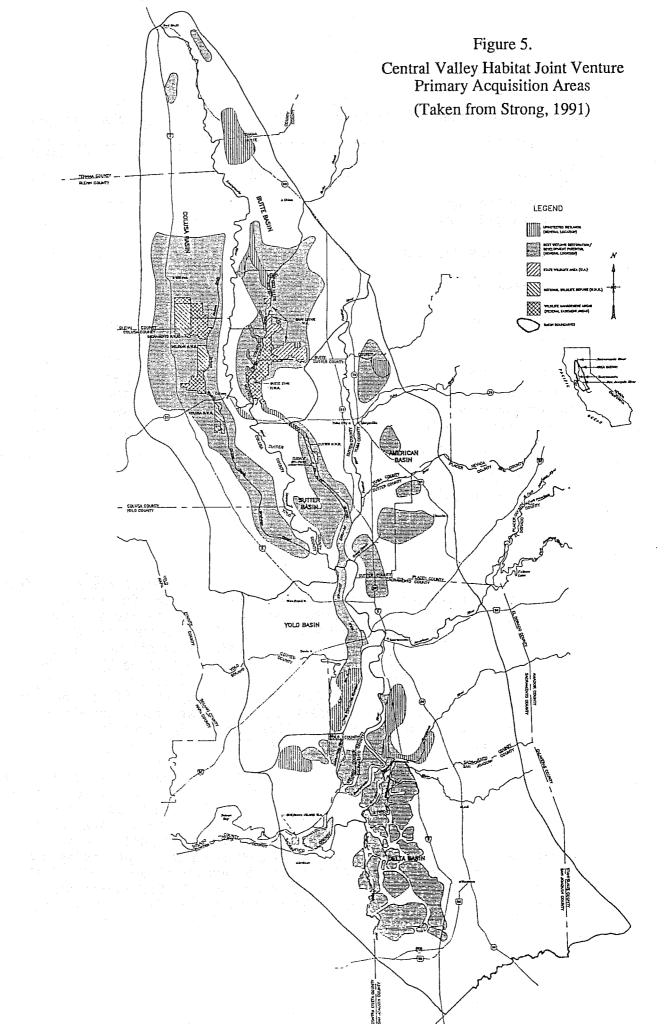


Table 6. Summary Information from Reclamation Plant Questionnaires (Responses Tabulated in Appendix G).

	Priv	rate (MGD)	Pub	lic (MGD)	
Information	<0.5	>0.5	<0.5	>0.5	Total
Total Number of Operating Facilities	302	2	300	152	756
Listed Design Capacity (MGD)	6.97	43.4	22.7	740	756
(1202)	0.77	T.J.	24.1	740	813
Number of Operating Facilities which Responded	38 (13%)	2 (100%)	191 (64%)	150 (99%)	381 (50%)
Data for Responding Facilities:					
Design Capacity (MGD)	1.13	43.4	17.8	734	796
Current Flow (MGD)	0.81	38.8	13.0	544	597
Reuse (MGD)	0.06	3.0	3.66	195	202
Available Water (MGD)*	0.75	35.8	9.34	352	398
Treatment Ponds (acres)	28.0	135	776	8485	9424
Ponds Providing Habitat (acres)	27.0	135	570	7541	8276
Volume Discharged to Surface Water (MGD)	0.00	35.8	0.704	308	345

MGD = million gallons per day

To determine the interest and concerns of owners and operators of municipal facilities given the opportunity to create habitat, the Central Valley Regional Board distributed questionnaires to 756 facilities on record as operating under Waste Discharge Requirements (WDRs) within the Central Valley Region. The owners and operators of the treatment plants were asked to provide information on the current wastewater flow treated by the facility, any reuse presently occurring, acreage of treatment ponds currently providing wildlife habitat, the level of interest in creating wildlife or wetland habitat, and any incentives or constraints that operators perceive with habitat creation. A copy of the questionnaire is in Appendix F. A summary of the information gathered is presented in Table 6.

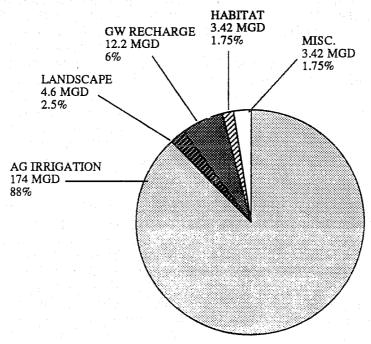
Overall, 50 percent of the operators surveyed responded to the questionnaire (381 out of 756 facilities). The fewest responses were received from private facilities having design flows less than 0.5 MGD. Campgrounds, churches, and mobile home parks, many of which use septic tank-leaching systems, fall into this group. A much higher response was received from public facilities. Approximately 64 percent (191 out of 300) of the public facilities with flows less than 0.5 MGD responded, and roughly 99 percent (150 of 152) of the treatment plants with flows greater than or equal to 0.5 MGD responded. The only two facilities with design capacities exceeding 0.5 MGD that did not respond were California State Prison, Corcoran and California State Prison, Madera.

^{*} available water equals the current flow minus the current reuse

Based on the questionnaires sent to both public and private facilities, there are 154 treatment plants with design capacities greater than or equal to 0.5 million gallons per day (MGD) currently producing wastewater in the Central Valley. The 0.5 MGD volume was chosen for initial analysis as these facilities would have sufficient wastewater to create approximately twenty to fifty acres of viable habitat. Together, the 154 facilities represent greater than 95 percent of the available flow in the Central Valley. Only two of the facilities with design capacities equal to or greater than 0.5 MGD are privately owned. The privately owned systems are Aerojet General Corporation in Sacramento County with a permit for 35.8 MGD and Dixon Canning Company in Solano County which produces 3.0 MGD for 80 days during tomato processing season (July to October). The remaining 152 facilities are public treatment systems.

Based on design capacity, 783 MGD of treated flow in the Central Valley is attributed to the 154 facilities with design capacities equal to or exceeding 0.5 MGD. However, not all of these treatment plants are operating to capacity. Currently treated water volume is reported at 583 MGD rather than the expected 783 MGD, or 75 percent of capacity. Not all of the water from these larger facilities is available for reuse on wetland habitat. The treatment plant operators reported that 34 percent (198 MGD) is already designated for other beneficial uses. Primary reuse is irrigated agriculture (174 MGD); however, additional reuse includes landscape (4.6 MGD), groundwater recharge (12.2 MGD), habitat enhancement (3.4 MGD), and miscellaneous uses such as wind and fire breaks, construction, washing of vehicles, and flushing of toilets (3.4 MGD) (Figure 6).

Figure 6. Current Amount and Percent of Reuse by Method for Facilities With Design Capacity >0.5 MGD.



In addition to the established reuse, these facilities also indirectly provide habitat through their use of treatment ponds (oxidizing and settling basins) and through direct discharge to surface waters. Of the 152 facilities on record as discharging more than 0.5 MGD, 8,620 acres of ponds are utilized as part of the treatment process. Approximately 90 percent (7,676 acres) of these ponds were noted to provide some level of wildlife use, ranging from brood rearing to migratory waterfowl rest stops.

In addition, these facilities discharge roughly 345 MGD (390,000 AF/yr) of treated water to surface streams, providing the opportunity for riparian habitat, aquatic life enhancement as well as downstream reuse by irrigators. Of this water, 55 percent or 190 MGD is discharged into the Sacramento River; and 4.6 MGD, 33 MGD and 67 MGD are discharged into the Feather River, Sacramento-San Joaquin Delta, and San Joaquin River, respectively (Appendix E). As discussed previously, the Cities of Willows and Alturas both discharge into waterways that could serve as supply for existing refuges. Willows discharges 1.12 MGD to Logan Creek which passes through the Sacramento NWR, and Alturas discharges 0.5 MGD to the Pit River adjacent to the Modoc NWR.

Eighty-eight of the larger facilities indicated potential interest in creating wildlife habitat. These 88 facilities represent 73 percent of the total water volume currently treated and produce approximately 300 MGD (335,000 AF/yr) which is not already designated for another use. The interested parties noted 19,000 acres of land among them which could be utilized for wildlife enhancement.

Twenty of the larger facilities had plans in the past, have current plans, or already provide wildlife habitat (Table 7). Five of the plants that considered reusing their wastewater for wildlife enhancement, Oroville, Willows, Roseville, Vacaville, and Earlimart, have dismissed that alternative. Oroville reviewed the possibility of diverting their 3.1 MGD discharge from the Feather River to the Oroville Wildlife Area, however the DFG was not interested in the project. In contrast, although Willows is essentially already supplying water to an established refuge through their discharge to Logan Creek, the City dismissed the idea of creating their own habitat because they felt that ". . . no wetland in the Sacramento Valley could meet [Central Valley Regional Board discharge requirements without post treatment. Roseville was another facility that dismissed their improved habitat plans after determining that irrigation was less costly than trying to meet discharge requirements imposed on wetlands. The City of Vacaville canceled their habitat plans after Travis Air Force Base opposed the project based on the potential hazard to aircraft from increased number of birds. Finally, Earlimart intended to create a wetland but were unable to meet guidelines established by the local Mosquito Abatement District.

The remaining 19 facilities identified 11,070 acres of land within reasonable distance of their operations that could be converted to habitat. Together, these 19 facilities produce 187 MGD (210,000 AF/yr) of water which is not already designated for reuse. Four of these facilities, Davis, Sacramento Regional, Tracy, and Oakley-Bethel Island are located near the Delta-Yolo Basin. As previously mentioned, the Delta-Yolo Basin was once the most extensive continuous source of wetlands in the state. Only one state wildlife refuge, Lower Sherman Island WMA, exists in the Basin. Approximately 8,250 acres of land near the four plants have been identified as having high potential for conversion to wildlife habitat.

Table 7. Municipal Facilities with Design Capacities > 0.5 MGD Who have Plans to Enhance Wildlife Habitat.

Notes		Discussed with DFG for use in Oroville Wildlife Area, but DFG not interested.	Trying to formulate plan to accomodate an increase to predicted 3.5 MGD flow. Two alternatives may enhance habitat 1) discharge to Colusa NWR 2) irrigate pasture. Neither cost effective at this time.	Plan dismissed due to discharge requirments.	Has created small wetland near Orland Airport.	Proposed facility. Two year development time frame for flow through system	Would like to enhance dry area of NWR next to plant.	Working with COE to develop during dry season of 1992. Six ac. riparian, 13 ac. seasonal.	Five year plan with DFG to create salmon and steelhead fish ladder. EIR being developed.	Explored wetland creation, rejected due to costs of chlorination/dechlorination irrigation more practical.	Will be working with Humboldt State University to create 2-3 small treatment wetlands near plant	Developing plans with DFG to install habitat prior to the 1998 expansion of the two facilities	Two year time frame.
Acres ID'd for Habitat	1	1	1	100			+5	50	70-1200		45	150	25
Stream Discharge	ę. Y	Feather River	Salt Creek	Logan Creek	-		Pit River		Auburn Ravine	Dry Ck to American River to Sac River		Sacramento River	Yuba River
Available		3.1	0.35	1.12	0.864	[0.12]	0.5	0.7	1.2	8.5	0.1	1.995	1.5
Flow (MGD) ent Reuse		0	0	0	0	[0.12]	0	0	0	0	9.0	0.005	0
Flow		3.1	0.35	1.12	0.864	Proposed	0.5	0.7	1.2	» 3.	0.7	7 ×	1.5
Design	<u>.</u>	6.5	0.5	1.12	2.1	[0.89]	0.5	0.7	1.23	11.75	0.7	∞ ∝	1.7
AREA County/Facility	SACRAMENTO VALLEY	BUTTE *Oroville (2)	COLUSA Williams (2)	GLENN *Willows (2)	Orland (2)	LAKE Stonehouse Mutual Water Co. (2)	MODOC Alturas (2)	PLACER Lincoln (2)	Auburn (2)	*Roseville (3)	SHASTA Shasta Dam Area PUD (2)	Redding (2+)	YUBA Marysville (2)

Table 7 continued:

Flow (MGD) Current Reuse Available Stream Discharge for Habitat Notes	0.3 0.7 One to two year time frame: shallow pond/marsh, working with DFG.	1.5 0 Delta plan: 250 ac. on existing Authority land and Jersey Island. Four year time frame.	1 150 Sacramento River 200 Pilot project in process (20 ac.) \$500,000 EPA award, discharge to supply	natural habitat downstream. 0 4.5 Old River 5000 Have developed an outline for a feasibility study, no funding in place yet, recommend		345	wetland, shallow marsh; flow through	0.2 0 Area designated as kitfox habitat.	. 0.5 Colony Br. #2 Ponds and irrigation to be in place by 1 October 1992.	1 0 Los Banos Ck. 500-700 24 ac. constructed treatment marsh. Plan to increase habitat as well as facility.	6.4 0 Hartley Slough 200 Plant expansion for January 1992. Discharge 1.4 MGD to wetlands.		0 0.6 Had plans: could not meet local Mosomito Abstemant District association	
				Alamo Ck. to Cache Slough Willow Slough	Cache Slough Willow Slough						Hartley Slough			
		1 156							. 0.5	1 0				1.6 0
1.5 1.5 4.5 4.5	1.5 160 160 5.2	160	4.5	5.2		۲C	ALLEY	0.2	0.5	_	6.4		9.0	1.6
1.5 1.5 9 9			9 11.4	11.4		4.75	OUIN	0.45	0.54	1.2	10		9.0	3
YUBA Beale AI:B (2) UZILTA-YOLO BASIN CONTRA COSTA Oakley-Bethel Island (2) SACRAMI:NTO SACRAMI:NTO SAR JOAQUIN Tracy (2) SOLANO *VURANO *VU	CONTRA COSTA CONTRA COSTA Oakley-Bethel Island (2) SACRAMISNTO SACRAMISNTO SAR Regional (2) SAN JOAQUIN Tracy (2) SOLANO *Vacaville (2)	SACRAMIENTO Sac Regional (2) SAN JOAQUIN Tracy (2) SOLANO *Vacaville (2)	SAN JOAQUIN Tracy (2) SOLANO *Vacaville (2)	SOLANO *Vacaville (2)		YOLO Davis (2+)	NORTHERN SAN JOAQUIN VALLEY	MERCED Santa Nella (2)	Dos Palos (2)	Gustine (2)	Merced (2)	TULARE BASIN TULARE	*Earlimont (2)	Dinuba (2)

MGD = Million gallons per day
Available = Current minus reuse
*Dismissed habitat plans
() = Treatment level

DFG = Department of Fish and Game NWR = National Wildlife Refuge COE = US Army Corps of Engineers

Table 8. Municipal Facilities with Design Capacities < 0.5 MGD Who Have Plans to Enhance Wildlife Habitat.

				The state of the s			
AREA County/Facility	Design	Flow Current	Flow (MGD) ent Reuse	Available	Stream Discharge	Acres ID'd for Habitat	Notes
SACRAMENTO VALLEY				:			
AMALDOR Amador Sanitation District [2]	0.35	0.35	0.35	0	. • .	52	1-2 year development time frame. Would like to create riparian habitat ditch at shoreline. Mule Creek Prison labor.
Pardec Reservior [2]	0.0001	0.0001	0.0001	0	• • • •	7	Treatment pond designed to include habitat.
Comanche N. Shore [2] 0.0001	0.0001	0.0001	0.0001	0		2	Treatment pond designed to include habitat.
BUTTE Bute College [2]	0.2	0.08	0	0.08	e de la composição Porta de la composição Porta de la composição d	10	Development time frame depends on funding source.
EL DORADO Auburn Lake Trails [1]	0.015	0.015	0	0.015		ı	3-10 year development time frame.
LASSEN Lassen Co. Water	0.1	0.1	0	0.1	Town (*) The G	15	21 acres available.
WOTES NORTHERN SAN JOAQUIN VALLEY	VALLEY						
CALAVERAS Royal Mt. King [2]	0.004	0.004	0.004	0	<u>.</u>	0.25	.25 acres of wetland existing.
Pardce Center [2]	0.003	0.002	0.002	0	•	4	Treatment pond designed to include habitat.
Camache S. Shore [2]	0.082	0.082	1 0 1544 1 1	0.082	· · · · · · · · · · · · · · · · · · ·	1.5	Treatment pond designed to include habitat.
TUOLUMNE Leland Meadows [3]	0.002	0.002	0	0.002		3	8 acres of lake, 5 acres of wetland.
TULARE BASIN TULARE Poterville KOA [2]	0.015	0.01		0.01		4.5	60 day development time frame for a flow through system. Ideas prohibited by costs at this time.

MGD = Million gallons per day Available = Current minus reuse [] = Treatment level

Table 9. Incentives Ranked by Water Treatment Plant Owners and Operators to Create or Enhance Wildlife Habitat.

	C	PERATOR RANKI	NG	
	FIRST	SECOND	THIRD	TOTAL
PRIMARY INCENTIVES				
Loans	2	16	11	29
Grants	101	36	25	162
Cost Sharing	9	22	26	57
Increasing Disposal Capacity	59	42	21	122
In-House Reduction in Treatment	12	28	23	63
Payment for Available Water	17	16	27	60
Other*	27	3	5	33
			TOTAL:	528
* OTHER INCENTIVES				
Reduced Regulation, Mitigation, Liability	8	1	1	10
-Meet Inland Surface Water Plans		1		1
Wildlife, Environmental, Recreation	6	1	3	10
Start-up, Operating, Maintenance Costs	10			10
Image of Company	1			1
Land Aquisition			1	1
			SUBTOTAL:	33

The majority of the smaller facilities (design capacity less than 0.5 MGD) that responded were not interested in creating wetland habitat. The lack of interest was based primarily on small flow volumes and lack of suitable land. A number of the facilities utilize septic tank systems and leach fields, which preclude habitat creation without redesigning the facility. Forty-five of the 229 smaller facilities which responded were interested in the idea of creating habitat. Thirteen of these facilities are in the process of creating or have plans to enhance wildlife habitat through the use of their reclaimed water. These thirteen facilities currently produce 0.678 MGD (760 AF/yr) of water and have 98 acres of treatment ponds which incidentally support wildlife (Table 8). In total, all the interested facilities with design flows <0.5 MGD currently produce 3.15 MGD (3,500 AF/yr) of water and reuse 0.43 MGD (480 AF/yr), leaving 2.72 MGD (3,020 AF/yr) available for habitat creation (Appendix G).

The owners and operators of the facilities were asked to rank six incentives in order of importance for creating habitat. Their choices included obtaining grants, increasing disposal capacity, reducing in-house treatment, payment for available water, cost sharing, and loans. In addition, the owners and operators listed incentives such as reducing regulation or liability, providing mitigation, improving wildlife, environmental, and recreational opportunities, decreasing operation and maintenance costs, improving the image of the company, and receiving aid with land acquisition. The top three choices were tabulated for each response with the results listed in Table 9.

The most frequently cited incentives were obtaining grants for the project and increasing disposal capacity of the facility. Approximately 45 percent of the operators listed grants as a first choice while 27 percent listed increasing their disposal capacity as their highest priority. Many of the incentives dealt with alternate methods of funding the project. These funding methods were ranked in the following decreasing priority: grants, payments for available water, cost sharing, and loans.

Combining two of these funding methods enabled the development of the San Jacinto Wildlife Management Area in Riverside County. The refuge receives the majority of its water supply from the Hemet Treatment Plant managed by Eastern Municipal Water District (EMWD). In order to initially receive and to guarantee continued supply, the Wildlife Conservation Board and DFG entered into an agreement with EMWD whereby the DFG financed approximately 40 percent of the cost to construct a 36-inch diameter, 10-mile pipeline from the Hemet Plant to the refuge in exchange for a 25-year contract to receive an initial 1,500 AF/yr, increasing to 4,500 AF/yr, of water at \$10 to \$15 per acre-foot. Water deliveries began in 1989, and to date, the refuge has been managing a very successful habitat.

Most of the facilities contacted also raised various concerns with the idea of creating or enhancing wildlife habitat with their water. Table 10 lists the concerns presented by the facilities and the relative frequency that each concern was expressed. Most of the issues noted fell within six categories: governmental concerns, management concerns, public concerns, physical constraints, monetary concerns, and habitat issues.

The smaller facilities noted physical constraints as their primary concern. Many of the operators did not feel that their facility was in an appropriate location or had enough available water to support habitat. The costs associated with creating and maintaining habitat was also an important issue. A number of the facilities had reservations over the possibility of increased government controls and regulation, particularly with increased difficulty with later expansion of the facility or change in water use. Some of the facilities express a great interest in the prospect of creating habitat but lacked any guidance on how to begin or maintain habitat.

The larger facilities (design capacity greater than or equal to 0.5 MGD) were less concerned with cost and more concerned with meeting regulatory requirements. In addition, lack of cooperation between agencies was noted in many instances as a reason to avoid attempting habitat creation. One operator considered there to be "too many strings attached to State and Federal funds" while another operator simply wants to avoid ". . overly bureaucratic/pedantic regulation by outside agencies." Yet another operator sees such a project as ". . . adding another layer of bureaucratic control and regulation." Many operators expressed the feeling that current standards cannot be met by natural habitats much less created habitat so there is a need "to recognize realistic discharge requirements for wetlands."

Table 10. Concerns Expressed by Owners and Operators of Water Treatment Systems Over Construction or Enhancement of Wildlife Habitat.

		MBER OF RESPON	SES
THE OF CONCERNS		PACITY (MGD)	тотат
TYPES OF CONCERNS	<.5 MGD	≥.5 MGD	TOTAL
GOVERNMENTAL CONCERNS			
Regulation	16	21	37
Meeting Standards -Effect Bay/Delta Hearings	5	14 1	19 1
Liability	7	9	16
No Guidelines	5	8	13
Loss of Control	2	5	7
Lack of Gov't Cooperation Eliminating Wetland if Necessary	2	5 1	7 1
SUBTOTAL:	37	64	101
MANAGEMENT CONCERNS			
Maintenance	11	14	25
Vector Control	2	14	16
Seasonality Security	2 12	2 2	4 14
Need Land for Other Use	1	3	4
Loss of Water for Current Reuse	2	6	8
SUBTOTAL:	30	41	71
PUBLIC CONCERNS			
Public Opinion	11	3	14
Odor Vector Control	2	1 14	1 16
Limiting Urban Development	2	3	5
SUBTOTAL:	15	21	36
PHYSICAL CONSTRAINTS			
Low Amount of Water	27	1 *	28
Lack of Land	12	10	22
Location	30	10 2	40 3
Proximity to Airport	1	_	
SUBTOTAL:	70	23	93
MONETARY CONCERNS			
Funding	24	18	42
Increased Cost of Treatment	· 7	1 2	8
Cost/Benefit Analysis Loss of Revenue		3 1	3 1
SUBTOTAL:	31	23	54
HABITAT CONCERNS			
Contaminate Ground Water Table		5	5
Contamination Habitat		4	4
Environmental Impact	1	3	4
SUBTOTAL:	1	12	13
SUMMATION:	184	184	368

Larger facilities were also concerned with management of habitat, citing maintenance and vector control as key issues. One operator contended that the idea of trying to utilize water from wastewater treatment plants "...to provide habitat for wildlife borders on the ridiculous." He is concerned that such habitat would become "...a receiving basin for every disease known to man." Other operators were concerned over the environmental impacts and the potential to contaminate habitat and/or the groundwater table.

Reviewing the questionnaires indicates that there is enough interest in utilizing reclaimed water to create habitat to warrant the development of statewide policy or guidelines governing such beneficial reuse. The concerns of the operators must be addressed before they can be expected to fully participate in any programs.

LIABILITY ASSOCIATED WITH CREATING ALTERNATE HABITAT

During the reclamation plant survey, owners and operators of the facilities repeatedly expressed concern over their potential liability for creating wetland habitat with treated wastewater. Both the operators of the facilities, as well as the Regional Board, must fully understand their individual responsibilities in managing and regulating, respectively, habitat created using treated wastewater. No guidelines currently exist. In California, habitat created using treated wastewater has been developed on a case by case basis. No overall policy governs management or regulation of the sites. No regulatory recourse has been determined should the reclaimed water be found to degrade habitat or promote avian disease or death. Before statewide policy can be prepared, a number of issues must be addressed. Some of these, with minimal clarification, are listed below:

1. A uniform definition of a wetland

Federal and State agencies are still struggling to adopt a definition for a wetland which satisfies all the agencies' criteria. A clear definition of wetland habitat is essential before any policy can be developed.

2. Determining whether *existing* and or *created* wetlands are waters of the state or navigable waters.

Waters of the United States and navigable waters are subject to protection under the federal Clean Water Act, and therefore, any discharge must be pursuant to a national pollutant discharge elimination system (NPDES) permit. The NPDES permit would describe or define the effluent limits or the receiving water standards that would have to be met by any discharge. These limits would be consistent with Board policy as described in the Basin Plan of the Region, the Inland Surface Waters Plan, or other state-wide plans and policies that may be available. Currently, wetlands which cross a state border or affect interstate commerce are considered waters of the United States. Should the wetland not affect interstate commerce, it is still considered a water of the State if it is adjacent to any navigable water other than wetlands. It has not been determined whether or not migratory waterfowl use may be interpreted to affect interstate commerce. There is no exemption based on the difference between existing vs. created habitat.

3. Determining if a *created* wetland which is part of a wastewater treatment process is considered a water of the state or a navigable water.

An exemption would only be available if the wetland is not, itself, affecting interstate commerce. Again, whether migratory waterfowl use may be interpreted as affecting interstate commerce, has not been determined.

4. Clarifying whether the objectives laid out in the Inland Surface Water Plan (SWRCB, 1991) or the Basin Plan (CVRWQCB, 1991) apply to existing, created, or treatment wetlands.

Constructed wetlands which support beneficial uses as a result of the discharge of reclaimed water are considered *Category A* water bodies as defined by the Inland Surface Water Plan (SWRCB, 1991). If site specific objectives have not been adopted for Category A water bodies by April 1997, water quality objectives set out in the Plan shall apply to that water body. At present, there is no policy on discharges to wetlands that are considered part of the wastewater treatment process. The Basin Plan (CVRWQCB, 1991) applies to all waters of the State and is superseded by the Inland Surface Water Plan should conflict arise.

- 5. Determining whether the discharger can stop a discharge into an existing, created, or treatment wetland if another use for the water is found and if the cessation of discharge would be in violation of the California Department of Fish and Game Code which states that there shall be no net loss of wetland acreage or habitat value.
- 6. Potential application of the Migratory Bird Treaty Act and the Endangered Species Act to wetlands receiving treated effluent, should that effluent be found to cause or promote waterfowl disease or death.

If treated effluent is being discharged into a Federal or State wildlife refuge area, the applicability of two laws must be considered: The Migratory Bird Treaty Act and The Endangered Species Act. As with the discharge of agricultural drainage water containing selenium into the Kesterson National Wildlife Refuge and resulting waterfowl deaths, an analogy could be found with a municipal effluent discharged into a refuge, or wetland used as part of the treatment process, that causes or promotes waterfowl disease or death. The Kesterson occurrence was viewed as a violation of the Migratory Bird Treaty Act because it was an unlawful "take" of waterfowl. A similar view could be taken for any damage caused by municipal wastewater.

A similar concern exists for a potential violation of the Endangered Species Act. If a discharge of municipal wastewater to a wetland did cause damage to endangered or threatened wildlife, either directly or indirectly, that discharge could be viewed as a violation of the Endangered Species Act.



7. Determining whether the discharger must comply with Section 1211 of the Water Code, which requires approval of the State Board prior to making a change in the location or amount of discharge of the treated water.

Prior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater, the owner of any wastewater treatment plant needs to petition the State Water Resources Control Board (State Board) to obtain approval for any such change. Before the permission to make such a change is granted, the petitioner needs to establish, to the satisfaction of the State Board, that the change will not operate to the injury of any legal user of the water involved.

Preliminary advice from the Legal Council of the State Board was sought to clarify and expand on the issues presented above. Although some of their comments have been incorporated, in general, legal staff found the issues to be "...complicated and not settle law" (Appendix F). Since most of the policy direction governing wetlands is federal, current findings may change should the U.S. Environmental Protection Agency or the courts clarify the issues. Legal staff determined that a full legal review would be necessary to adequately address the issues presented.

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APPENDIX A

Assembly Bill No. 4328

CHAPTER 1646

An act relating to reclaimed water for wildlife refuges.

[Approved by Governor September 30, 1990. Filed with Secretary of State September 30, 1990.]

LEGISLATIVE COUNSEL'S DIGEST

AB 4328, Baker. Water reclamation: wildlife refuges.

Under existing law, the State Water Resources Control Board is the principal state agency responsible for the coordination and control of water quality.

This bill would require the board to conduct a survey to identify water and sewage reclamation plants that produce water that would be suitable and available for use in central valley wildlife refuges. The bill would require the survey to include specified determinations, if feasible. The bill would require the board to report on the survey to the Legislature and the Governor by January 1, 1992.

The people of the State of California do enact as follows:

SECTION 1. (a) The State Water Resources Control Board shall conduct a survey to identify water and sewage reclamation plants in this state that produce water that would be suitable and available for use in central valley wildlife refuges. To the extent feasible, the survey shall determine the predicted quantities of water through the year 2000. To the extent feasible, the study shall also determine the predicted quality of the water that would be produced from the identified sources.

(b) The board shall prepare and submit a report on that survey to the Legislature and Governor not later than January 1, 1992.



Memorandum

Date

April 4, 1991

Mr. Dennis Westcot Chief, Agricultural Unit California Regional Water Quality Control Board 2332 Routier Road Sacramento, CA 95827-3098

From : Department of Fish and Game

 $_{\mathsf{Subject}}:$ Use of Reclaimed Water on Established and Proposed Wetlands and Wildlife Refuges

The use of reclaimed water may have considerable potential for maintenance and restoration of wetlands throughout California. We fully support the evaluation and investigation being undertaken by your agency.

We have scant experience with the use of reclaimed water and most of the comments I have received from staff have been negative. However, in my opinion, more of the problems experienced thus far appear to be insurmountable.

We have no established policy regarding the use of reclaimed water, but I will go over the guidelines we would or will use to develop such a policy.

We would not accept any reclaimed water which contained acute or chronically toxic elements or compounds. We are particularly wary of low level toxicants which might bioaccumulate. In evaluating the use of reclaimed water we must rely on existing basin standards and published literature. Where uncertainty exists we would want additional research to ensure safe use.

Our experience shows us that reclaimed water can reduce marsh productivity for a variety of reasons including salinity and shading. Where reclaimed water could reduce marsh productivity, we could not accept its use in lieu of existing water supplies of higher quality. We could use reclaimed water to augment an existing supply or conjunctively during periods of water shortages.

The Department of Fish and Game has a responsibility to restore substantial acreage of wetlands throughout California and in particular in the Central Valley. I believe we are obligated to consider the wise use of reclaimed water in that effort. To do otherwise would be unreasonable.

In summary, we would not accept the use of reclaimed water of lessor quality as a substitute for existing supplies on existing wetlands. We do believe reclaimed water of suitable quality does

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have potential for augmenting existing supplies or in a conjunctive use program. For new or restored wetlands the use of reclaimed water has considerable potential and we believe it to be good policy to fully explore that potential.

Thank you for your interest.

Dick Daniel

Fish and Wildlife Program Manager



United States Department of the Interior FISH AND WILDLIFE SERVICE

Fish and Wildlife Enhancement
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-184

April 17, 1991

Dennis Westcot Chief, Agricultural Unit California Regional Water Quality Control Board Central Valley Region 3443 Routier Road Sacramento, California

Dear Mr. Westcot

This letter responds to your request for guidance on the acceptability of reclaimed water for use in National Wildlife Refuges, established and proposed wetlands, and conjunctive use on proposed or established areas. Our understanding of the California State Board's definition of reclaimed water is that it is water which has been through a treatment process and is suitable for a beneficial use or controlled use that would not otherwise occur.

One of our concerns regarding the approval of the use of reclaimed water in refuges and other wetlands, in addition to the health and contaminants risk, is that such water should not be viewed. now or in the future. as a replacement for existing fresh water supplies. Also, wetlands proposed as mitigation for projects which result in the loss of existing wetlands should not be established with reclaimed water as the sole or predominant water supply.

The use of sewage effluent or "reclaimed water" in wetlands has the potential to provide both benefits and harm to fisheries and water dependent wildlife. Creation or expansion of habitat, or supplementing other water supplies is a potential benefit. Possible contaminant and pathogen loading and the creation of environmental conditions which enhance disease outbreaks can be major risk factors in the use of reclaimed water.

Explosive disease outbreaks of cholera and botulism resulting in thousands of dead waterfowl have been linked to poor water quality. This past winter approximately 6,000 waterbirds were lost to a cholera epidemic on the Modesto and Los Banos oxidation ponds (for sewage treatment). The die-off included over 50 individuals of a federally protected threatened species, the Aleutian Canada goose. Sewage effluents may both transport pathogens or create water quality conditions conducive to disease outbreaks. The latter appears to be a more significant problem.

In addition to disease impacts, contaminant loading is also a concern in the use of "reclaimed water". Because of lower tolerance thresholds in aquatic organisms for contaminant concentrations water quality standards for the protection of aquatic life are frequently more stringent than those designed to protect human health in drinking water. Aquatic systems and some fish and wildlife species may be adversely impacted by exposure to different water supplies with radically different ionic compositions. Exposure of aquatic invertebrates to water of radically different quality may lead to invertebrate die-offs and precipitate the outbreak of botulism in waterfowl. Contaminants which may bioaccumulate such as heavy metals, pesticides, PCBs and toxic trace elements such as selenium, would be unacceptable components of the reclaimed water if present at concentrations that would pose either an acute or chronic toxicity hazard or bioaccumulation potential. Although the recommended concentration for selenium in refuge water supplies is 2 ppb, the Fish and Wildlife Service has not established any official policy regarding specific concentrations for water supplies to wetlands.

The nature of the contamination, the source of the reclaimed water, habitat needs and the ability of upstream treatment design to decontaminate effluent are key factors in a site specific decision to use reclaimed water. Careful and informed management that considers site specific environmental factors could minimize the risks. Part of the die-off at the oxidation ponds this year at Los Banos and Modesto can be attributed to a lack of alternative habitat that would have spread the bird populations, and reduced the risk of disease. These ponds were not intended to serve as habitat yet they provide practically the only waterfowl habitat in the area. Creation of additional habitat managed specifically for waterfowl in these areas would be highly desirable. The oxidation pond die-off however illustrates why sites likely to be frequented by endangered species or used as migrational staging areas for discrete wildlife populations must be carefully managed if reclaimed water is used. While reclaimed water could possibly be used to a limited degree wetland habitat in these areas should be predominantly proven safe water.

The source of reclaimed water should not be dominated by such agricultural users as poultry processing plants or other intensive operations producing animal wastes as these are likely to contain pathogens of wildlife concern. Acceptable reclaimed water is likely to be limited to municipal sources that employ secondary or tertiary treatment and which have minimal industrial components.

If reclaimed water is used to support wetlands, the use, availability and control of reclaimed water should be at the discretion of a knowledgeable wildlife manager so that habitat management needs rather than sewage disposal needs drive the application of waters to wetlands. Best water management practices should be applied in all cases where reclaimed water is used in wetlands. The ability to rapidly drain a wetland area or dilute surface waters by rapid addition of fresh water are highly desirable features of wetlands using reclaimed water. In areas of high rates of evaporation, effluent discharge rates should be adjusted to maintain stable water levels during hot summer months. Seasonal wetlands however, have unique values and should not be converted by reclaimed water into permanent wetlands. In estuarine environments the conversion of salt marshes into freshwater marshes by effluent discharge decreases biodiversity and productivity and may

negatively impact suitability of the habitat for endangered species such as the California Clapper Rail.

Reclaimed water should be tested for suitability prior to application including standard water quality parameters of dissolved oxygen, pH, etc as well as chemical analysis for concentrations of organics and inorganics, and standard bioassays. The most conservative criteria for protection of aquatic life using results of site specific bioassays should be employed, because EPA guidance criteria alone may not be sufficient to protect all aquatic organisms within a given wetland. Wetlands using reclaimed water will need monitoring programs for disease and contaminant induced effects. Conjunctive uses of reclaimed water to grow food crops for waterfowl or to irrigate pasture may be acceptable but similar testing and monitoring should be applied as many of the agricultural fields may also serve as seasonal wetlands.

Sincerely,

Wayne White, Field Supervisor, Sacramento Field Office

cc: ARD_FWE ARD-ARW ARD-AFR

SWRCB, att: Michael Perrone

California Department of Health Services Draft Title 22

Article 12. Uses of Reclaimed Water Not Cited in Articles 3, 4, 5, and 5.1

Section

60363. Wetlands

PROPOSED REGULATION

Section 60301, Article 1, of Title 22, California Code of Regulations is to be amended as follows:

Article 1. Definitions

60301. Definitions.

- (a) Reclaimed Water. "Reclaimed water" means water which, as a result of treatment of domestic wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur.
- (b) Reclamation Plant. Reclamation plant means an arrangement of devices, structures, equipment, processes and controls which produce a reclaimed water suitable for the intended reuse.
- (C) Regulatory Agency. Regulatory agency means the California Regional Water Quality Control Board in whose jurisdiction the reclamation plant is located.
- (d) Direct beneficial use. Direct beneficial use means the use of reclaimed water which has been transported from the point of production to the point of use without an intervening discharge to waters of the state.
- (e) Food Crops. Food crops mean any crops intended for human consumption.
- (f) Spray Irrigation. Spray irrigation means application of reclaimed water to crops by spraying it from orifices in piping.
- (g) Surface Irrigation. Surface irrigation means application of reclaimed water by means other than spraying such that contact between the edible portion of any food crop and reclaimed water is prevented.
- (h) Restricted Recreational Impoundment. A restricted recreational impoundment is a body of reclaimed water in which recreation is limited to fishing, boating, and other non-body-contract water recreation activities.
- (i) Nonrestricted Recreational Impoundment. A nonrestricted recreational impoundment is an impoundment of reclaimed water in which no limitations are imposed on body-contact water sport activities.
- (j) Landscape Impoundment. A landscape impoundment is a body of reclaimed water which is used for aesthetic enjoyment or which otherwise serves a function not intended to include public contact.
- (k) Approved Laboratory Methods. Approved laboratory methods are those specified in the latest edition of "Standard Methods for the Examination of Water and Wastewater", prepared and published jointly by the American Public Health Association, the American Water Works Association, and the Water

Pollution Control Federation and which are conducted in laboratories approved by the State Department of Health.

- (1) Unit Process. Unit process means an individual stock in the wastewater treatment sequence which performs a major single treatment operation.
- (m) Primary Effluent. Primary effluent is the effluent from a wastewater treatment process which provides removal of sewage solids so that it contains not more than 0.5 milliliter per liter per hour of settleable solids as determined by an approved laboratory method.
- (n) Oxidized Wastewater. Oxidized wastewater means wastewater in which the organic matter has been stabilized, is nonputrescible, and contains dissolved oxygen.
- (o) Biological Treatment. Biological treatment means methods of wastewater treatment in which bacterial or biochemical action is intensified as a means of producing an oxidized wastewater.
- (p) Secondary Sedimentation. Secondary sedimentation means the removal by gravity of settleable solids remaining in the effluent after the biological treatment process.
- (q) Coagulated Wastewater. Coagulated wastewater means oxidized wastewater in which colloidal and finely divided suspended matter have been destabilized and agglomerated by the addition of suitable floc-forming chemicals or by an equally effective method.
- (r) Filtered Wastewater. Filtered wastewater means an oxidized, coagulated, clarified wastewater which has been passed through natural undisturbed solids or filter media, such as sand or diatomaceous earth, so that the turbidity as determined by an approved laboratory method does not exceed an average operating turbidity of 2 turbidity units and does not exceed 5 turbidity units more than 5 percent of the time during any 24-hour period.
- (s) Disinfected Wastewater. Disinfected wastewater means wastewater in which the pathogenic organisms have been destroyed by chemical, physical or biological means.
- (t) Multiple Units. Multiple units means two or more units of a treatment process which operate in parallel and serve the same function.
- (u) Standby Unit Process. A standby unit process is an alternate unit process or an equivalent alternative process which is maintained in operable condition and which is capable of providing comparable treatment for the entire design flow of the unit for which it is a substitute.
- $\left(v\right)$ Power Source. Power source means a source of supplying energy to operate unit processes.

- (w) Standby Power Source. Standby power source means an automatically actuated self-starting alternate energy source maintained in immediately operable condition and of sufficient capacity to provide necessary service during failure of the normal power supply.
- (x) Standby Replacement Equipment. Standby replacement equipment means reserve parts and equipment to replace brokendown or worn-out units which can be placed in operation within a 24-hour period.
- (y) Standby Chlorinator. A standby chlorinator means a duplicate chlorinator for reclamation plants having one chlorinator and a duplicate of the largest unit for plants having multiple chlorinator units.
- (z) Multiple Point Chlorination. Multiple point chlorination means that chlorine will be applied simultaneously at the reclamation plant and at subsequent chlorination stations located at the use area and for some intermediate point. It does not include chlorine application for odor control purposes.
- (aa) Alarm. Alarm means an instrument or device which continuously monitors a specific function of a treatment process and automatically gives warning of an unsafe or undesirable condition by means of visual and audible signals.
- (bb) Person. Person also includes any private entity, city, county, district, the State or any department or agency thereof.
- (cc) Wetlands. Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (33 CFR323.2(c): 1984)

NOTE: Authority cited: Section 208, Health and Safety Code and Section 13521, Water Code.

Reference: Section 13520, Water Code.

Article 12 is to be added to Chapter 3 of Division 4, of Title 22, California Code of Regulations to read as follows:

Article 12. Uses of Reclaimed Water Not
Cited in Articles 3, 4, 5, and 5.1

Section 60363 is to be added to Article 12 of Title 22, California Code of Regulations is to read:

60363. Wetlands.

- (a) Notification and consultation with the Department of Health Services and the local vector control or mosquito abatement district shall precede any project or proposed intention to use reclaimed wastewater for use in the development creation or enhancement of any wetlands or wildlife refuges.
- (b) Quality of incoming reclaimed water used as a source of supply in wetlands or wildlife refuges shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some locations in the treatment process the median number of coliform organisms does not exceed 2.2 per 100 milliliters as determined from the bacteriologic results of the last 7 days for which analyses have been completed, or, if the treated wastewater in the wetlands, after mixing with non-wastewater, meets the above criteria.

Responsible party (ies)

(c) Owner/manager of property or water...

(d) CRITERIA FOR DESIGN OF POND OR IMPOUNDMENT STRUCTURE SHALL PROVIDE:

- (1) Rapid draining of water during periods of severe mosquito production or disease outbreaks.
- (2) Shoreline configuration that does not isolate pools from the main body of water.
- (3) Drainage of shallow areas to a central deep area with an outlet spillway to maintain water elevation.
- (4) A water depth at a minimum of three feet during summer.
- (5) Shore banks steep enough to prevent pooling as water level recedes, to allow wave action and access by predators.

(e) WATER MANAGEMENT SHALL PROVIDE:

(1) A constant depth, at least three feet during summer.

(f) VEGETATION MANAGEMENT SHALL:

- (1) Limit dense stands of aquatic vegetation from shore margins in shallow areas to minimize harborage for mosquitoes and to enhance wave action.
- (2) Ensure that aquatic vegetation is maintained in small vegetation islands.

- (3) Avoid plants that mat on the surface such as water hyacinth, smartweed, water primrose, knotgrass, pondweed, Hydrilla or filamentous algae.
- (4) Periodically remove or partially harvest aquatic vegetation to reduce density. Certain plants, in moderate stands, such as cattails and bullrushes, generally do not promote mosquito productivity.

(g) WATERWAY MAINTENANCE SHALL ENSURE THAT:

- (1) Levees, drainage ditches and other water structures be constructed and maintained to prevent seepage or flooding into adjacent lowland areas.
- (2) Levee faces are steeply-sloped to limit growth of marginal vegetation.
- (3) Dikes or drains have steep slopes (1.5-2 foot horizontal to 1 foot vertical) which will lower growth of aquatic vegetation.

(h) WATER QUALITY MANAGEMENT SHALL:

- (1) Inhibit organically enriched effluent or other chemical pollutants from entering wetlands.
- (2) Avoid islands of floating solids.
- (3) Prohibit the use of treated or untreated wastewater in a rice field and other land where water may stand three days or more.

(i) BIOLOGICAL CONTROL SHALL:

(1) Stock wetlands with the mosquitofish, Gambusia affinis.

(2) Exclude game fishes or other predatory fishes that will reduce the population of mosquitofish.

(j) CHEMICAL CONTROL MANAGEMENT SHALL:

(1) Allow provisions for air and ground applications of <u>Bacillus</u> thuringiensis var. <u>israelensis</u> methodrene regulators, or other target specific pesticides as needed.

(k) SURVEILLANCE MANAGEMENT SHALL:

- (1) Be funded for operation as necessary by local mosquito abatement and vector control districts.
- (2) Provide access for continual larval and adult mosquito surveillance and the continuous monitoring of water quality and vegetation density as deemed necessary by the mosquito and vector control districts.

NOTE: Authority cited: Section 208, Health and Safety Code and Section 13521, Water Code.

Reference: Section 13520, Water Code.



Memorandum

Ms Jeanne Chilcott
California Regional Water Quality
Control Board Central Valley Region
3443 Routier Road
Sacramento, California 95827-3098

November 12, 1991

From : Department of Fish and Game

Use of Reclaimed Water on Wetlands

Subject:

Thank you for your inquiry regarding the possibility of establishing an interagency agreement with the Department of Fish and Game (DFG) to provide input for your report on the use of reclaimed water on wildlife refuges. As we understand it, you are particularly interested in identifying the locations and water supply needs of potential reuse areas, as well as the water quality guidelines that are needed to ensure that wetland species and habitats would be enhanced by the reuse program.

The DFG strongly supports the use of reclaimed water to benefit fish and wildlife. The DFG has a mandate to substantially increase the acreage of wetlands in California, particularly in the Central Valley. We believe that the use of reclaimed water can be beneficial in creating and restoring wetlands to help us meet this responsibility. Therefore, the DFG is interested in conducting the proposed work.

We estimate that completion of the identified tasks would require twelve months of staff time at the Associate Biologist level. Combined expenses for salary, operating expenses, and overhead would total \$75,000. The most difficult task would be to define the water quality guidelines needed to protect fish and wildlife resources utilizing the habitats enhanced by the use of reclaimed water. As you know, the setting of water quality standards requires a rigorous review of available scientific information. Setting guidelines or standards for the approximately two dozen necessary parameters is not a trivial task. However, we believe that we could provide initial recommendations for the needed guidelines given the resources specified above.

Your interest in DFG involvement in this program is appreciated. If you would like to discuss this subject further, please contact Mr. Pete Phillips, Environmental Services Supervisor, Environmental Services Division, Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814, telephone (916) 653-9714.

John Turner, Acting Chief Environmental Services Division

SCOPE AND OBJECTIVES

- A. Wetlands and wildlife refuges in the Central Valley are recognized nationally as the key vital link in the Pacific Flyway. These areas, however, are in a critical state due to urban and agricultural expansion coupled with a prolonged drought which has increased competition for the available water supplies. This has been compounded by the loss of agricultural drainage which made up a significant portion of several refuge water supplies. There is a critical need to augment these water supplies.
- B. Concurrent with this critical need for water in the wetlands and wildlife refuges, cities and industries are facing increasing costs to treat wastewater to meet new regulatory requirements. These new requirements include new restrictions on disposal of the water.
- C. The State and Regional Boards have promoted the reclamation and reuse of wastewater through policies and regulatory actions. In the Central Valley, 20% of the 500,000 acre feet of wastewater discharged annually is directly reused. This volume represents 50% of the reuse occurring in California; yet less than 1% of the reuse in the Central Valley occurs on wetlands or wildlife refuges. The potential for increased use is very high.
- D. Based on the positive results from pilot studies on reuse at a few wetland sites in the San Francisco and Humboldt Bay Areas, the legislature recognized, through AB 4328, the need to promote greater use of reclaimed water in wetlands and wildlife refuges in the Central Valley. AB 4328 requires the State Board to prepare a report to the legislature on "water and sewage reclamation plants whose water would be suitable and available for use in the Central Valley wildlife refuges".
- E. This project will consist of two phases. The first phase involves an evaluation of managed wetland areas suitable for wastewater reuse; the quantities of water needed in these managed wetland areas under both normal and drought conditions; the quality of water needed to enhance wetland values and under drought conditions sustain wetland and wildlife habitat; and the monitoring needed to ensure safe use in wetlands and wildlife refuges.
- F. The second phase concentrates on assisting Board staff in evaluating high potential reuse areas including an initial assessment of the impacts caused by diversion of the treated water from its present use. In addition, guidance will be given on needed changes in Central Valley Regional Board policy and procedures to promote reuse in wetland areas.
- G. The objective of this project is to have the Department of Fish and Game assist the Board in designating locations and quantities of municipal and industrial wastewater what are available for reclamation and reuse to enhance wetlands and wildlife refuges.

WORK TO BE PERFORMED

The contractor shall be responsible for the performance of the work as set forth herein below within the completion times, as specified in Attachment ____ to this Exhibit and for the preparation of products and a final report, as specified in Section ____ of this Exhibit.

A. Task 1 - Delineate Potential Reuse Areas

- 1. Using 1:100,000 scale maps or similar scale maps, delineate the boundaries of state wildlife refuges in the Central Valley of California that contain managed wetlands.
- Using 1:100,000 scale or similar maps, delineate private lands managed as wetlands within the Central Valley of California;
- 3. Using 1:100,000 scale or similar maps, delineate other state wildlife refuge lands that could benefit from additional water supplies for vegetation or food source management.

B. <u>Task 2 - Water Supply Needs in Wetlands</u>

- 1. Based upon areas defined in A1 and A3 above define the water supply needs for the state wildlife refuges.
- Delineate existing water supplies and shortage in the various types of water years including wet, normal, dry and critical.
- 3. If data is available, define the water supply needs and shortage for the private wetlands shown in A-2 above.
- 4. For the potential reuse areas outlined in A1 and A3 above the routes of water inflow to these areas shall be delineated on the maps prepared in task 1.

C. <u>Task 3 - Reclamation and Reuse Potential</u>

Based upon location (Task 1) and water supply needs (Task 2), the reclamation and reuse potential of each state and private wetland areas should be ranked using a high, medium and low designation. Regional Board staff will match this ranking with available good quality wastewater supplies to set priorities for reclamation and reuse.

D. <u>Task 4 - Water Quality Needs in Refuges</u>

Water quality limitations (guidelines) will be defined for reclaimed municipal wastewater that is to be used in managed wetland areas, refuge food source lands and other wildlife areas in the refuges. These guidelines are to include both limited-term use and continuous use criteria. The water quality guidelines are to include parameters for nutrients (N,P,K), Organics, including pesticides, oil and grease, Oxygen demand (dissolved oxygen, BOD, Settleable Solids, Suspended Solids), pH, Public health (disinfection levels including chlorine residual), salt (EC, TDS, Cl, B) and trace elements (Se, Zn, Cu, etc.).

E. <u>Task 5 - Monitoring</u>

Develop guidance to the Regional Board on establishment of a monitoring program including the use of the three species bioassays to ensure that managed wetland values are being enhanced by the reclamation and reuse program.

F. <u>Task 6 - Site Specific Assessment</u>

Assist the Regional Board staff in evaluating high potential reclamation and reuse sites to ensure that enhancement of managed wetlands will be occurring but not at the expense of other environmental values including loss of riparian or other habitats.

G. <u>Task 7 - Draft and Final Reports</u>

- 1. Prepare and submit for review by the State Board's Contract Manager and other interested agencies, a draft report describing all work completed under this contract at the completion of each task.
- 2. Prepare a final report including material presented in the draft reports modified as appropriate to respond to comments by the State Board's Contract Manager and interested agencies on the draft.



Table D-1. Narrative and Water Quality Objectives and Toxicity Objectives as Outlined in the Inland Surface Waters Plan (SWRCB, 1991).

Narrative Water Quality Objectives

Inland surface water communities and populations, including vertebrate, invertebrate, and plant species, shall not be degraded as a result of the discharge of waste.

The natural taste and odor of fish, shellfish, or other inland surface water resources used for human consumption shall not be impaired.

Toxic pollutants shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health.

The concentration of contaminants in waters which are existing or potential sources of drinking water shall not occur at levels which are harmful to human health.

The concentration to toxic pollutants in the water column, sediments, or biota shall not adversely affect beneficial uses.

Toxicity Objectives

There shall be no acute toxicity in ambient waters, including mixing zones.

There shall be no chronic toxicity in ambient waters outside mixing zones. The water quality objective for chronic toxicity is 1.0 TUc as a daily average.

Table D-2. Numerical Water Quality Objectives for Protection of Freshwater Aquatic Life as Outlined in the Inland Surface Waters Plan (SWRCB, 1991).

Constituent	Unit	4-Day Average	Daily Average	<u>1-Hour</u> Average	Instantaneous <u>Maximum</u>
		100		36 0	
arsenic	ug/1	190			
cadmium	ug/1	b		b	
chlordane*	ng/1		4.3		
chromium (VI) ^a	ug/ 1	11		16	
copper	ug/1	С		С	
DOT*	ng/l		1.0		
dieldrin	ng/1		1.9		. '
endosulfan*	ng/l		56		220
endrin*	ng/1		2.3		180
heptachlor	ng/1		3.8		
hexach lorocyc lohexane)- .				
garma	ng/1		80		
lead	ug/1	d	. 	d	
mercury	ug/1	-		2.4	
nickel	ug/1	е		е	
PCBs*	ng/1	'	14		
pentachlorophenol	ug/l	ħ		h	
se len ium	ug/l	5.0		20	
silver	ug/1				ť
toxaphene	ng/1	0.2		730	
tributyltin	ng/1	20 ⁱ	40		60
zinc	ug/1	g		g	***

^{* =} See Appendix 1 for definition of terms

mg/l = milligram(s) per liter; ug/l = microgram(s) per liter; ng/l = nanogram(s) per liter; "--" = Not applicable

a = Dischargers may, at their option, meet this limitation as total chromium.

b-g = Objectives for these metals are expressed by the following formulas, where $H = \ln (\text{hardness})$ in mg/l as CaCO^3 :

- b = 4-DAY AVERAGE cadmium = e^{0.7852H} 3.490; 1-HOUR AVERAGE cadmium = e^{1.128H} 3.828. For example where where hardness is 50 mg/l, the 4-DAY AVERAGE cadmium = 0.66 ug/l and the 1-HOUR AVERAGE cadmium = 1.8
- c = 4-DAY AVERAGE copper = e^{0.8545H} 1.465; 1-HOUR AVERAGE copper = e^{0.9422H} 1.464. For example where hardness is 50 mg/l, the 4-DAY AVERAGE copper = 6.5 ug/l and the 1-HOUR AVERAGE copper = 9.2 ug/l.
- d = 4-DAY AVERAGE lead = e1.273H 4.705; 1-HOUR AVERAGE lead = e1.273H 1.460. For example where hardness is 50 mg/l, the 4-DAY AVERAGE lead = 1.3 ug/l and the 1-HOUR AVERAGE lead = 34 ug/l.
- e = 4-DAY AVERAGE nickel = e0.846H + 1.1645; 1-HOUR AVERAGE nickel = e0.846H + 3.3612. For example where hardness is 50 mg/l, the 4-DAY AVERAGE nickel = 88 ug/l and the 1-HOUR AVERAGE nickel = 790 ug/l.
- f = INSTANTANEOUS MAXIMUM silver = $e^{1.72H} 6.52$. For example where hardness is 50 mg/l, the INSTANTANEOUS MAXIMUM silver = 1.2 ug/l.
- g = 4-DAY AVERAGE zinc = e^{0.8473H} + 0.7614; 1-HOUR AVERAGE zinc = e^{0.8473H} + 0.8604. For example where hardness is 50 mg/l, the 4-DAY AVERAGE zinc = 59 ug/l and the 1-HOUR AVERAGE zinc = 65 ug/l.
- h = The 4-DAY AVERAGE objective for pentachlorophenol is $e^{1.005(pH)}$ 5.290. This is 13 ug/l at pH = 7.8. The 1-HOUR AVERAGE objective for pentachlorophenol is $e^{1.005(pH)}$ 4.830. This is 20 ug/l at pH = 7.8.

i = Six-Month Median.

Table D-3. Numerical Water Quality Objectives for Protection of Human Health as Outlined in the Inland Surface Waters Plan (SWRCB, 1991).

		sting or Potential ces of Drinking Water	<u>Othe</u>	r Waters
Constituent	Unit	30-day Average	Unit	30-Day Average
CONSTITUTE				
Noncarc inogens**				
cadmium	ug/1	10		
4-chloro-3-methylphenol	ug/1	3000***	- 1	anger ar in a se
chromium (VI) ^a	mg/1	0.05		
copper	ug/1	1000.0***		र । व े ड्डिं
1,2-dichlorobenzene*	ug/1	2700	mg/1	18
1,3-dichlorobenzene	ug/1	400	ug/1	2600
2-4-dichlorophenol	ug/1	0.30***		
endosulfan*	ug/1	0.9	ug/l	2.0
endrih*	ug/1	0.8	ug/l	0.8
fluoranthene	ug/1	42	ug/l	. 42
lead	ug/1	50.0	: 	
mercury	ng/1	12	ng/l	12
nickel	mg/l	0.6	mg/l	4.6
pheno l	ug/1	300***	·	
se len ium	ug/1	10		
silver	mg/1	0.05		·
toluene	ug/1	10000	mg/l	300
zinc	mg/1	5.0***		
Carcinogens**				
aldrin	pg/l	130	pg/1	140
arsenic	ug/1	5.0		
benzene	ug/l	0.34	ug/1	21
chlordane*	ng/l	0.08	pg/1	81
chloroform	ug/1	100	ug/1	480
DDT*	ng/l	0.59	pg/1	600
1,4-dichlorobenzene	ug/1	9.9	ug/l	64
dichloromethane	ug/1	4.6	ug/1	1600
dieldrin	pg/1	140	pg/1	140
halomethanes*	ug/1	100	ug/1	480
heptachlor	ng/1	0.16	ng/1	0.17
heptachlor epoxide	ng/1	0.07	ng/1	0.07
hexachlorobenzene	ng/1	0.66	pg/1	690
hexach lorocyc lohexane				
a lpha	ng/1	3.9	ng/1	13
beta	ng/1	14	ng/1	46
gamma	ng/1	19	ng/l	62
PAHs*	ng/1	2.8	ng/1	31
PCBs*	pg/1	. 70	pg/1	70
pentach lorophenol	ug/1	0.28	ug/l	8.2
TCDD* equivalents	pg/1	0.013	pg/l	0.014
toxaphene	ng/1	0.67	pg/l	690
2,4,6-trichlorophenol	ug/l	0.34	ug/1	1.0

^{** -} Note: Certain dischargers may be subject to more stringent requirements pursuant to Chapter 6.6 of Division 20 of the California Health and Safety Code.

mg/l = milligram(s) per liter; ug/l = microgram(s) per liter;

ng/l = nanogram(s) per liter; pg/l = picogram(s) per liter; "--" = Not applicable

a = Dischargers may, at their option, meet this limitation as total chromium.

Table D-4. Total Ammonia and Un-ionized Ammonia Water Quality Objectives for Protection of Aquatic Life in Wetlands (Marshack, 1991).

	u.		tional An				eria ·
	С	riteria M	eximum C	oncentri	tions (A Tuon-1	rg.)
ì	L	for Am	monia at	these is	mperati	116# (.C.)	
Hq	0	5	10	15	20	25	30

		Un-i	onized Ar	nmonia (mg/1 48 5	iH3:i	
8.50	0.0091	0.0129	0.0182	0.026	0.036	0.036	0.036
6.75	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
7.00	0.023	0.033	0.046	0.066	0.093	0.093	0.093
7.25	0.034	0.048	0.068	0.095	0.135	0.135	0,135
7.50	0.045	0.064	0.091	0.128	0.181	0.181	0.181
7.75	0.056	0.080	0.113	0.159	0.22	0.22	0.22
8.00	0.065	0.092	0.130	0.184	0.26	0.29	0.25
8.25	0.065	0.092	0.130	0.184	0.25	0.29	0.25
9.50	0.065	0.092	0.130	0.184	0.26	0.29	0.29
8.75	0.065	0.092	0.130	0.184	0.26	0.26	0.28
9.00	0.065	0.092	0.130	0.184	0.26	0.29	0.25
·	i .	• 1 (otal Amm	onia (mg.	CHN BE I	2)	
6.50	35	33	31	30	29	20	14.3
8.75	32	30	28	27	27	18.8	13.2
7.00	28	28	25	24	23	18,4	11.6
7.25	23	22	20	19.7	19.2	13,4	9.5
7.50	17.4	16.3	15.5	14.9	14.6	10.2	7.3
7.75	12.2	11,4	10.9	10.5	10.3	7.2	5.2
8.00	8.0	7.5	7.1	6.9	6.8	4.8	1.5
8_25	4.5	4.2	4,1	4.0	3.9	2.9	2.1
8.50	2.8	2.4	23	2.3	23	1.71	1.28
8.75	1.47	1,4	1.37	1.38	1.42	1.07	0.83
9.00	0.86	0.83	0.83	0.86	0.91	0.72	0.58

		to p	rotect: Fr	bient Wi eshwater Concent	Aquatic	Life	
рH	0			these Te			30

Salmonios	or Other Sens	ILIYA COICWEL	er Species P	resent —			
		Ų n - 11	A bezino	mmonia (mg/las h	Hati	
6.50	0.0007	0.0009	0.0013	0.0019	0.0019	0.0019	0.0019
6.75	0.0012	0.0017	0.0023	0.0033	0.0033	0.0033	0.0033
7.00	0.0021	0.0029	0.0042	0.0059	0.0059	0.0059	0.0059
7.25	0.0037	0.0052	0.0074	0.0105	0.0105	0.0105	0.0105
7.50	0.0068	0.0093	0.0132	0.0186	0.0186	0.0186	0.0186
7.75	0.0109	0.0153	0.022	0.031	0.031	0.031	0.031
8.00	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035
8.25	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035
8.50	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035
8.75	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035
9.00	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035
		. i (stat Amm	onia (mg	/ as NH3	į)	
8.50	2.5	24	2.2	2.2	1,49	1.C4	0.73
6.75	2.5	24	2.2	2.2	1.49	1.04	0.73
7.00	2.5	24	2.2	22	1.49	1.04	0.74
7.25	2.5	24	2.2	2.2	1.50	1.04	0.74
7.50	2.5	24	2.2	2.2	1.50	1.05	0.74
7.75	23	2.2	2.1	20	1.40	0.99	0.71
8.00	1.53	1.44	1.37	1.33	0.93	0.68	0.47
8.25	0.87	0.82	0.78	0.76	0.54	0.39	0.28
8.50	0.49	0.47	0.45	0.44	0.32	0.23	0.17
8.75	0.28	0.27	0.26	0.27	0.19	0.15	0.11
9.00	0.16	0.16	0.16	0.16	0.13	0.10	0.08



APPENDIX E

The following is a site-by-site discussion of the availability of water from municipal treatment plants that are in the vicinity of each of the ten National Wildlife Refuges, the eight State Wildlife Management Areas and the Grassland Resource Conservation District, a privately owned wetland area. The discussion that follows assumes there is a need for the water and a willingness to accept, neither of which may be applicable.

A. Modoc National Wildlife Refuge

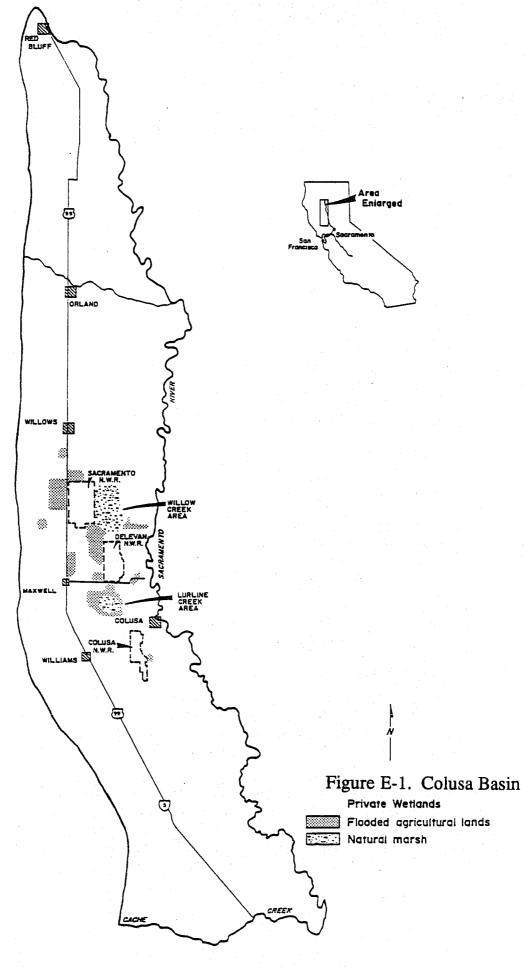
This 6,203-acre refuge is located in Modoc County just south of the City of Alturas in the Pit River Valley. Local watersheds provide the entire refuge water supply with the South Fork Pit River, Pine Creek, Parker Creek and Dorris Reservoir the main sources. As shown in Table 3, the Modoc NWR has a firm water supply for 90 percent of its needs. The City of Alturas Wastewater Treatment Plant which discharges 0.5 mgd (1.5 AF/day) sits immediately adjacent to the NWR but the treated water is discharged directly to the Pit River. In our survey, city staff indicated an interest in developing wetlands habitat prior to their discharge to the Pit River. Present USFWS policy, however, is likely to limit development of a permanent use in the refuge.

B. Ash Creek Wildlife Management Area

This 11,525 acre management area, acquired by DFG in 1986, was formerly a cattle ranch located in Big Valley, Modoc and Lassen Counties between the towns of Adin and Bieber. A large portion of the refuge is a marsh area with extensive waterfowl breeding. Ash Creek which flows through the area is a fish spawning area including the fully protected Modoc Sucker. The town of Bieber downstream of the refuge does not have a treatment plant while the town of Adin, immediately upstream of the refuge discharges only 20 AF/yr. The flow presently goes to 5 acres of oxidation ponds. The low flow and the 5-mile distance the water would need to be transported make reuse of this wastewater source impractical.

C. Sacramento National Wildlife Refuge

This 10,775-acre refuge is located in the Logan Creek watershed of the Colusa Basin approximately five miles south of Willows (Figure E-1). Land use includes seasonally flooded habitat, permanent ponds, upland habitat and waterfowl food production. The main source of water to the refuge is surface water delivered by the federal Central Valley Project. Water is also diverted from Logan Creek which flows through the refuge. The only city in the immediate vicinity (ten mile radius) is Willows in Glenn County. The City of Willows Wastewater Treatment Plant discharges to Logan Creek which flows into the Refuge. The 1.12 mgd (3.5 AF/day) is presently being reused as needed in the refuge. The discharge is regulated by an NPDES permit. There is some concern that the discharge may have elevated ammonia levels (Grewell, 1989).



D. Delevan National Wildlife Refuge

This 5,663-acre refuge is located in a rural area of the Colusa Basin (Figure E-1). The refuge, located seven miles east of Maxwell, consists of permanent ponds, rice, millet fields, seasonal marshes and irrigated pasture. The refuge has no firm water supply. There are no towns or cities within reasonable distance of the refuge. The nearest municipality, the City of Maxwell, would have to develop a seven to eight mile conveyance along with a large pumping plant to deliver its water to the refuge. As Maxwell is currently only discharging 0.07 mgd this would only add 78 AF/yr for reuse at a very high cost.

E. Colusa National Wildlife Refuge

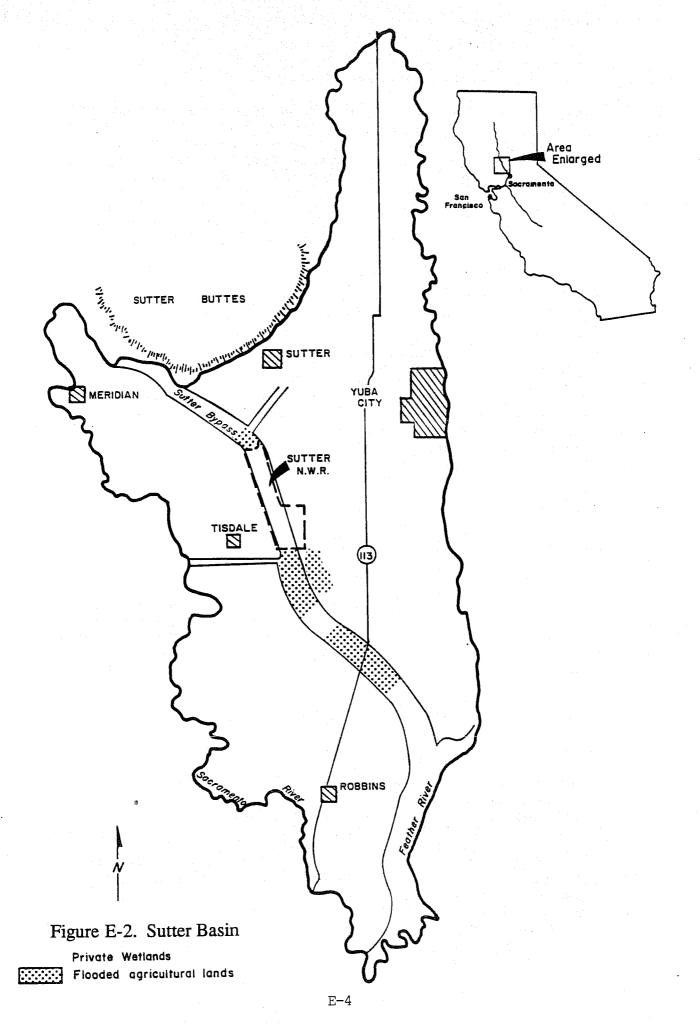
This 4,042-acre refuge is located one-half mile southwest of Colusa in the Colusa Basin (Figure E-1). The refuge consists of permanent ponds, seasonal marshes and upland areas. The refuge has no firm water supply. The towns in the immediate vicinity of the refuge include Williams and Colusa. In correspondence to the Board, the City of Williams noted that they are looking at a discharge to the Refuge as part of their facility's upgrading; however, such a discharge does not appear to be cost effective at this time nor has the refuge expressed interest in receiving such water. The City of Colusa's facility, which is in close proximity to the refuge, contains 55 acres of open water ponds. These ponds, according to the city, already have extensive waterfowl use; however, no plans have been presented to utilize the water specifically for habitat due to concerns over meeting increased regulatory requirements. In addition, the refuge has expressed no interest in receiving water from the City, especially since several endangered or listed species frequent the refuge.

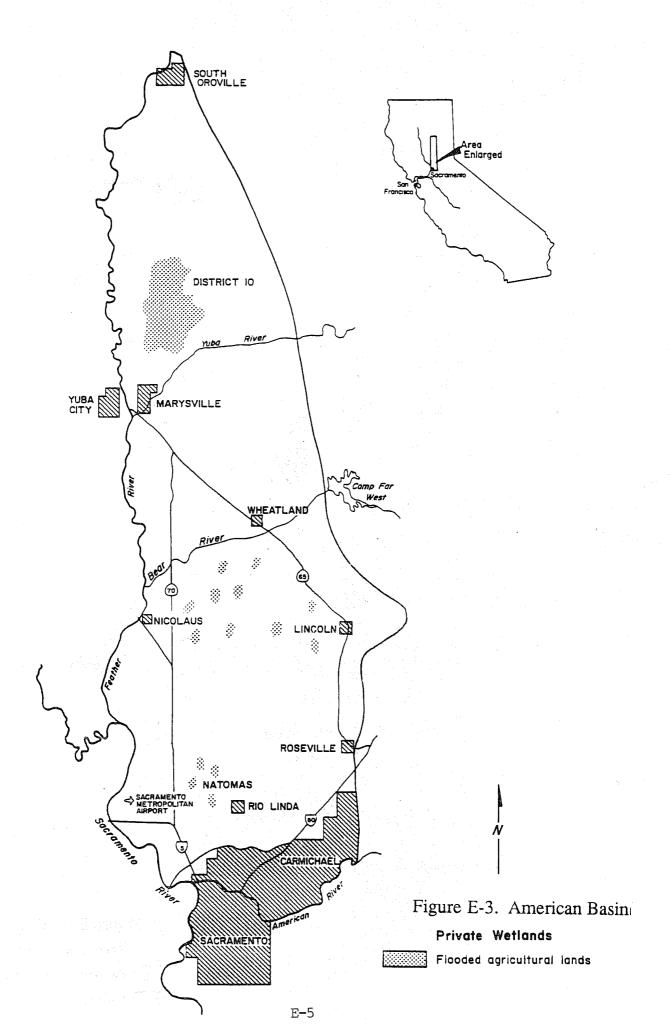
F. Sutter National Wildlife Refuge

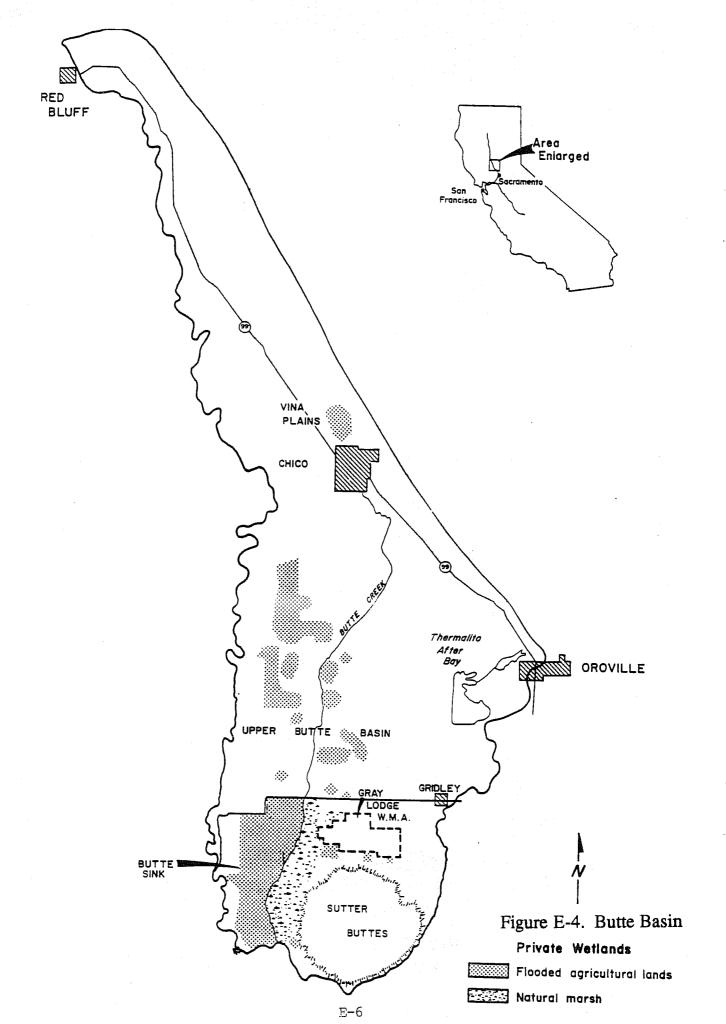
This 1,985-acre refuge sits in the Sutter Bypass, an area where historically, flood flows from the Sacramento River, Butte Sink, and Feather River inundated large portions of the 57,000 acre Sutter Basin year round. The refuge is located eight miles southwest of Yuba City. Because of the isolated nature of the refuge and the continued flood threat, no towns or cities exist within reasonable distance to transport water to the refuge (Figure E-2). No refuges exist in the adjacent American River Basin (Figure E-3).

G. Gray Lodge Wildlife Management Area

This 8,400-acre refuge was established in 1931 as the first wildlife refuge in the Sacramento Valley. Gray Lodge WMA is located in both Butte and Sutter Counties and lies two miles north of the Sutter Buttes and ten miles southwest of Gridley (Figure E-4). The refuge consists of native marsh, permanent ponds, uplands, and winter wheat cultivation and has a firm water supply of 8,000 AF/yr (18 percent of that necessary for optimum habitat). The closest city, Gridley, produces 0.8 mgd, or approximately 890 AF/yr, of municipal wastewater, all of which is currently reused for ground water recharge. Transportation costs for the minimal amount of water, and DFG policy make Gridley an unlikely water supply. No other cities exist within reasonable distance to transport water to the refuge.







H. Lower Sherman Island WMA

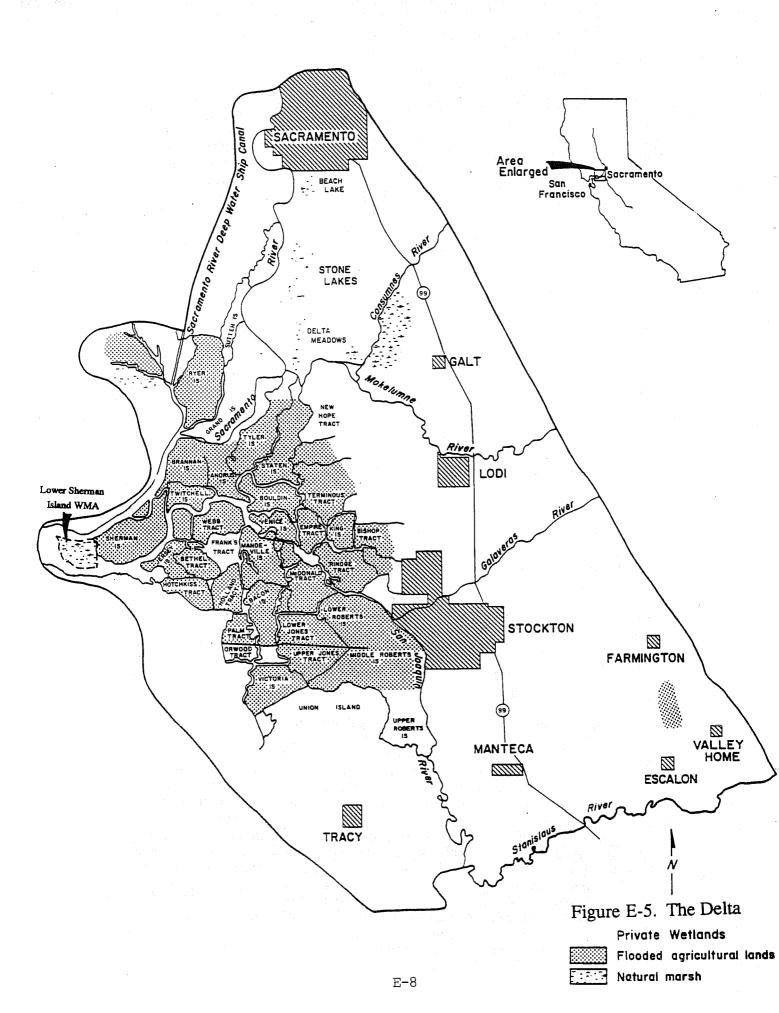
A partially flooded 3,100-acre island in the lower Sacramento-San Joaquin Delta makes up the Lower Sherman Island Wildlife Area (Figure E-5). Although fishing is the primary attraction on the island, a maze of channels, shallow marsh areas, mud flats, willow thickets, and dense stands of tules provide abundant wildlife habitat. Water supply is based on tidal influence; and therefore the habitat closely resembles the natural state of the Delta before agricultural development. The island is in an isolated area. No municipalities exist within a reasonable distance to transport water to the area. Sherman Island WMA is the only refuge in the Delta-Yolo Basin. The Yolo Basin is shown in Figure E-6.

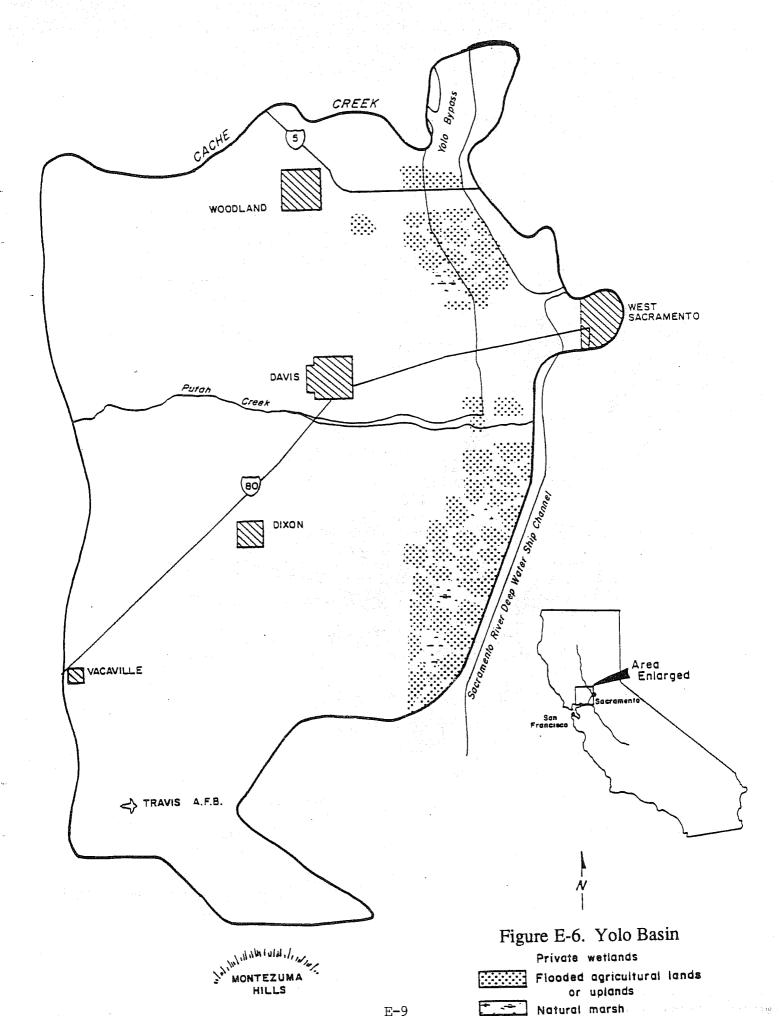
I. Grassland Resource Conservation District (RCD)

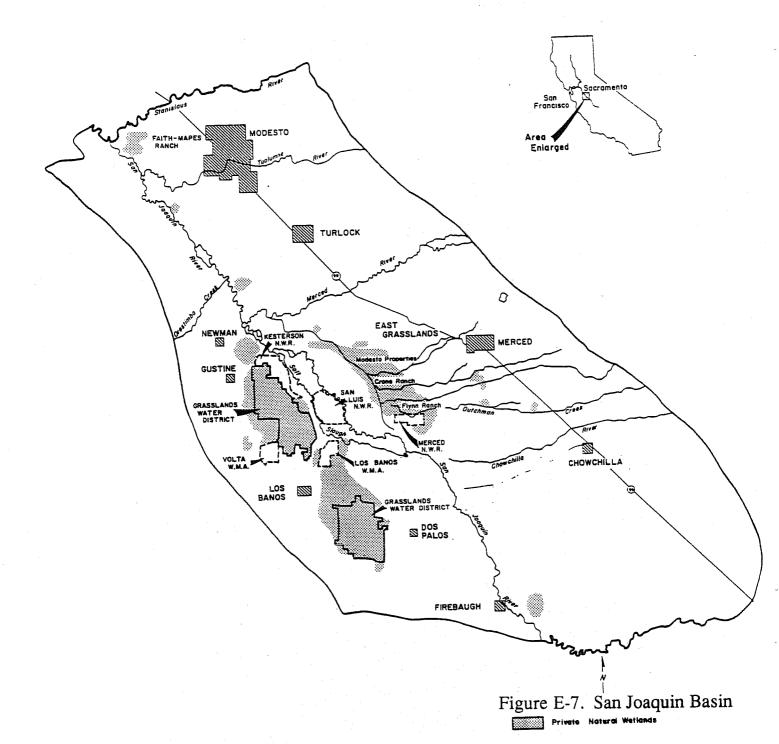
The Grassland RCD consist of 75,000 acres of privately owned land in the northern San Joaquin Valley along the west side of the San Joaquin River. The land is managed primarily as private duck clubs with roughly 28,000 acres protected by Federal Easement which severely restricts development of the land for alternate uses. Current firm water supply is 50,000 AF/yr which only represents 28 percent of the water necessary to optimize habitat. The majority of water for the RCD was historically provided by agricultural return flows. The discovery of selenium contamination in this flow curtailed any further use of the drainage on waterfowl habitat. As the most extensive continuous wetland area remaining in California, this district is in desperate need of a firm water supply (pers communication with Grassland Water District).

The Grasslands RCD is split into a northern and southern section (Figure E-7). The southern unit of the Grassland RCD is upslope of the City of Los Banos. The only other city in the vicinity is Dos Palos. The City of Dos Palos, which produces 0.5 mgd (560 AF/yr), is finalizing plans to create 300 acres of ponded habitat across from their treatment facility. The wastewater flow currently is discharged into Colony Branch #2 and provides both riparian habitat as well as supply water for agricultural irrigation and Grasslands RCD use downstream. The ponded area should be on line by October 1992. At that time the discharge of reclaimed water into the Grassland RCD will cease. There are no Federal or State Refuge Land in the southern portion of the Grassland Area (south of Hwy 152).

The northern unit of the Grassland RCD extends in a North-South direction from near Los Banos in the south to near Gustine in the north (Figure E-7). The cities of Gustine and Los Banos are at a distance where wastewater reuse could be considered. The City of Gustine produces 1.0 mgd (1,120 AF/yr) of wastewater and lies four miles west of the RCD boundary. The city has twenty-four acres of constructed marsh cells which provide partial water treatment before the water is discharged to Los Banos Creek where it provides both riparian habitat and an agricultural irrigation and wetlands water source for downstream users. Forty-one additional acres of oxidation ponds and settling basins are also managed by the City and attract migrating waterfowl. Proposed expansion of the City's treatment facility includes increasing the wildlife habitat to 500-700 acres just outside the Grassland RCD. Although the plan would greatly increase the habitat managed by the City, it would severely limit present water reuse that takes place in the North Grassland RCD and further downstream on Los Banos Creek.







The City of Los Banos produces 2.0 mgd (2,250 AF/yr) with only a small portion utilized for pasture irrigation. The remaining water percolates and evaporates from 300 acres of open water ponds which attract abundant migrating waterfowl as a resting point. The City has considered water deliveries to surrounding managed wetlands but no plans are yet in place. The City would face an expensive upgrade in order to treat their wastewater to levels needed for a discharge into an established wetland area. At present, the oxidation ponds produce a low-cost treatment alternative for the City. The City would also face the long-term problem of salt control as their wastewater carries a high TDS level.

J. Volta Wildlife Management Area

This 3,000 acre refuge lies along the southwest edge of the north unit of the Grassland RCD. The refuge is primarily large alkali ponds with waterfowl areas containing a variety of aquatic communities. The refuge has a firm water supply of 10,000 AF/yr which covers about 60 percent of the refuge needs. The only water access point to the refuge is the Volta Wasteway from the San Luis Dam and Forebay. The only wastewater treatment plant near or adjacent to the Volta Wasteway is Santa Nella which produces approximately 230 AF/yr. This water is presently reused for irrigation of cropland. It is unlikely that this water could be used in the refuge because of present DFG policy on wastewater nor could additional wetlands be created closer to the plant as much of this area is designated as San Joaquin Fit Fox habitat.

K. Los Banos Wildlife Management Area

This 5,586 acre refuge is for maintenance of native marsh habitat. The refuge lies four miles northeast of Los Banos. The City of Los Banos wastewater ponds are in close proximity to the refuge but present DFG policy and the low level of treatment presently provided would prevent its use in the immediate future (See the discussion of the City of Los Banos under the Grassland RCD.)

L. San Luis National Wildlife Refuge

This 7,430-acre refuge is the largest public refuge in the Grassland area. The refuge is approximately 12 miles northeast of the City of Los Banos. Because of its remote proximity, there are no municipal wastewater sources within reasonable distance of the refuge.

M. Kesterson National Wildlife Refuge

This 5,900-acre refuge consists of natural marshlands and grassland/vernal pool habitat. The refuge is located 4 miles east of Gustine (20 miles northeast of Los Banos). Because of the remote location, no municipal wastewater sources are within reasonable distance of the refuge. Delivery of Gustine wastewater is impractical as it would require an expensive pumping and distribution system through private wetlands.

N. Salt Slough Wildlife Management Area

This 2,241-acre refuge was acquired in 1990. It has 1,106 acres of wetlands and has rights to divert water from Salt Slough. Because of its remote location, there are no municipal wastewater sources near the refuge.

O. China Island Wildlife Management Area

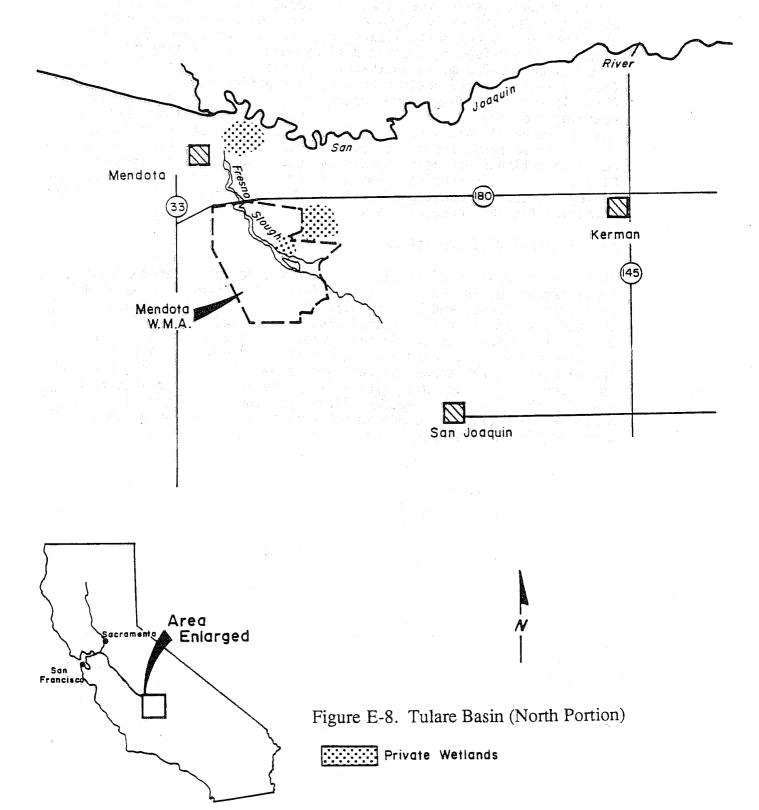
This 3,877-acre refuge was acquired in 1990. It is located 3 miles northeast of Gustine. The refuge has no firm water supply. The Cities of Gustine and Newman are in the immediate area of the refuge. The Plan for the City of Gustine was described under I. (Grassland RCD). The City of Newman has a wastewater facility adjacent to the refuge. The City of Newman currently produces 0.6 mgd (roughly 670 AF/yr) of wastewater which is used to irrigate 170 acres of fodder crops. Newman also manages 100 acres of oxidation ponds with 90 of these acres indirectly supporting waterfowl use. Talks with the city on use of the water led the DFG to oppose use of their water in the refuge because of the high salt content of the wastewater. It is unlikely the salt content can be reduced in the foreseeable future.

P. Merced National Wildlife Refuge

This refuge consist of 2,561 acres of wetlands, croplands and uplands. Located approximately nine miles southwest of the City of Merced, the refuge is one of the most important wintering areas in California and the Pacific Flyway for the lesser Sandhill Crane (Grewell, 1988). No firm water supply is available for the refuge. The refuge is currently dependent on ground water as a water source which makes the facility expensive to operate due to high energy costs associating with pumpage. The closest city, Merced, produces 7.3 mgd (8,150 AF/yr) of wastewater. Of this water, 1.4 mgd (1,560 AF/yr) flows into a city owned 400 acre wetland habitat created as mitigation for plant expansion. The remaining 5.9 mgd (6,590 AF/yr) flows into Hartley Slough, a tributary of Owens Creek. This runoff represents 41 percent of the flow needed by Merced NWR to maintain optimum habitat, but the present policy by USFWS prohibits use of this water for a permanent water supply. The City of Merced is planning to expand their treatment facility by 1995. At that time, the City plans to increase the wetland habitat by 200 acres.

Q. Mendota National Wildlife Refuge

This refuge consists of 12,105 acres surrounding a portion of Fresno Slough in the northern most corner of the Tulare Basin (Figure E-8). A 900-acre ecological reserve for the protection of endangered plant species lies adjacent and to the northeast of the refuge. Approximately 85 percent of the water necessary to provide optimum habitat is currently contracted to Mendota NWR. The nearest municipality, the City of Mendota lies three miles northwest of the refuge boundary. The City produces 1.0 mgd (1,100 AF/yr) of waste water which is currently disposed of on agricultural land. The City also maintains seven acres of oxidation/settling basins which inadvertently support waterfowl habitat. Due to the high cost of transporting the water, it is unlikely that this water would be available to the refuge. No other municipalities exists within a reasonable distance to transport water to the refuge.

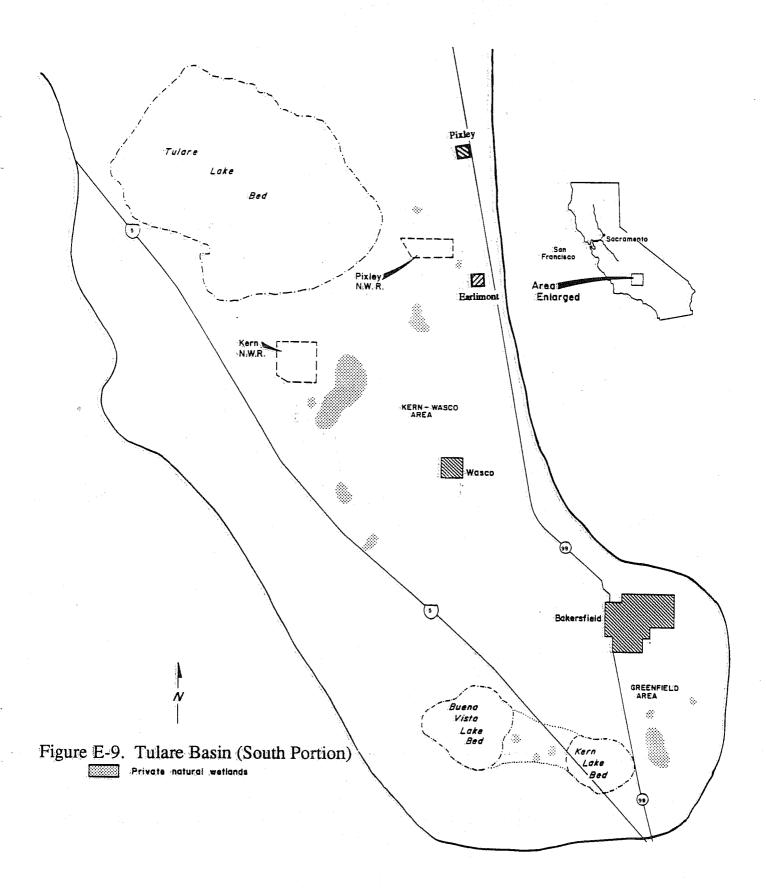


R. Pixley National Wildlife Refuge

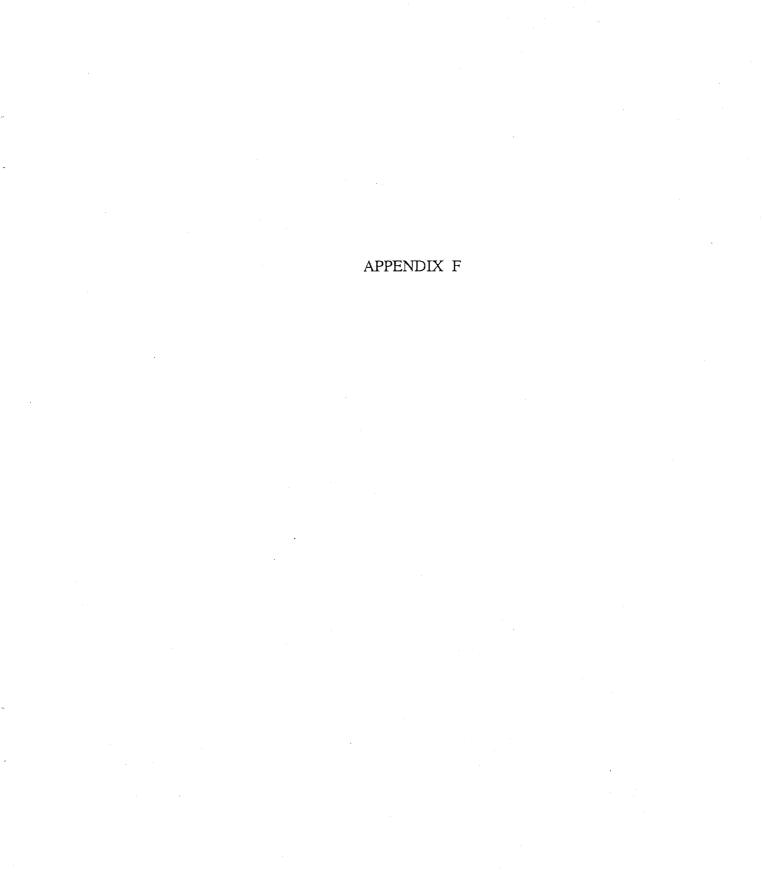
This 8,800-acre refuge is located just southeast of the historic Tulare Lake Bed (Figure E-9). Without a firm water supply, the refuge consists primarily of grassland habitat with some riparian plants along Deer Creek, which transects the refuge and forms most of the southern boundary. Approximately 3,700 acres have been set aside as habitat for the endangered blunt-nosed lizard, and are currently used for livestock grazing. The refuge is located 3 miles west of the Tulare County town of Earlimart, and 5 miles southwest of Pixley. The treated wastewater flow at Pixley is currently reused for irrigation and since only 220 AF/yr is produced, conveyance losses would result in almost no water reaching the refuge. The town of Earlimart produces almost 700 AF/yr that is currently disposed of on 30 acres of percolation-oxidation ponds. These ponds serve indirectly for waterfowl use but reuse of this water in wetlands has been opposed by the local Mosquito Abatement District. This is consistent with the DHS ban in the lower San Joaquin Valley on reuse of municipal effluent in rice production because of the potential for the encephalitis mosquito.

S. Kern National Wildlife Refuge

This refuge consists of 10,618 acres and was "established to restore a small segment of the wetland habitat impacted by the drainage of Buena Vista, Kern, Goose, and Tulare Lakes" (USBR, 1989). The refuge is located just south of the historic Tulare Lake Bed and 20 miles west Delano, the nearest town. No firm water supplies currently exist for the refuge but it is managed as wetlands, croplands, and uplands. Approximately 2,260 acres has been set aside as a natural research area for desert plants and to provide critical habitat for two endangered species, the blunt-nosed leopard lizard and the San Joaquin Kit fox. No municipalities exist in close enough proximity to the refuge to provide a reasonable water supply (Figure E-9).



C



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD— CENTRAL VALLEY REGION

3443 ROUTIER ROAD, SUITE A 3ACRAMENTO, CA 95827-3098 PHONE: (916) 361-5600 FAX: (916) 361-5686



12 August 1991

To: Operators of Municipal Treatment Facilities

USE OF RECLAIMED WATER ON WILDLIFE HABITAT

There is increased interest at both the state and national level to recreate the former wetlands of the Central Valley. These wetlands are a vital link in the migratory route of many waterfowl. Our agency has been mandated to report to the legislature on "water and sewage plants whose water would be suitable and available for use in Central Valley wildlife refuges" (AB4328 [Baker]). To make this legislative assessment, we need input from the operators of these facilities on the amount of water available for reuse, any reuse presently occurring, and the level of interest in your agency for creating wetland habitat.

Wetland habitat, as considered here, is heavily vegetated areas interspersed with open water areas. Large storage ponds would *not* be considered habitat as they rarely provide shelter and nesting sites. We are, however, interested in any storage ponds affiliated with your operation which may currently be providing habitat or feeding and resting areas. In addition, we are interested to hear any concerns you have with creating wetland habitat in the vicinity of your treatment plant or urban area. A questionnaire is attached which should provide us the necessary information while taking up a minimal amount of your time. The questionnaire can be folded and mailed. My address is on the back.

The report to the legislature is due November 1991, therefore your timely response would be appreciated. Please return the completed questionnaires to us by 30 August 1991. If you would like to discuss the report, feel free to call me at 916/361-5689.

Thank you in advance for you cooperation.

Jeanne Chilcott

Land and Water Resource Specialist

eanne Chilest

JEC:jk

Attachment



RECLAMATION PLANT INFORMATION - GENERAL

COUNTY:

Facility	Name:	Contact Person:
Volume	Treated:	Level of Treatment:
Current	Method & Location of Disposal:	
Is the tr	eated wastewater currently reused?	
î.	f yes, explain the method and the volume of	reuse.
Er ann		
*-		
I	f storage, treatment or settling basins are us how many acres of ponds are used?	ed in the present treatment and reuse operation,
I	s there currently wildlife and waterfowl use	of these ponds?
Have yo	ou ever considered creating or enhancing wet	land habitat as a method of reuse?
.1	f yes, do you have current plans:	
	Is suitable land available?	esno, acreage:
	Development Time Frame:	
	Type of wetland proposed (i.e., flow th	ru/ponded/seasonal):
	Proposed Location:	
	Available Funding:	
! I !	fono, is your agency interested in creating an	vetland habitat project?
	Do you have land available which may	
	•	d habitat can be created or enhanced?
-	<u>, </u>	
Please r	ank the following in the order of importance	as incentive for creating a wetland:
	loans grants cost share increasing disposal capaci	in-house reduction in treatment payment for available water other incentives (list)
	oncerns do you have regarding creating wetla	nd habitat, whether seasonal or permanent, with your



Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

	Treatment	Design Flow	Current Flow	Reuse	Available	Ponds (ACRES)	Ponds Used By Wildlife (ACRES)	Available:Land For:Habitat (ACRES)	Notes	
County/Hactury	Level	(INIGID)	(ADINI)	(dom)	(april)	(Control of	(2)			
INTERESTED FACILITIES										
Design Capacity <0.5 MGD										
AMADOR										
*(Amador Meadows)	(2+)	(0-0.45)	①	<u> </u>	<u> </u>	2	ı	[10]	PROPOSED	
*Amador Reg San Auth	7	0.35	0.35	.2L, .15M		52	52	1		
*Pardec Reservoir	7	0.001	0.001	.001H			.,.	ı	Designed to include habitat	
*Camanche N Shore WTP	7	0.001	0.001	.001H	ļ.	7	Ċ	J	Designed to include habitat	
*Butte College WWF	7	0.2	0.08	ı	80'0	10	10	3.5		
CALAVARAS	١									
*Royle Mt King Mine	7	0.004	0.004			0.25	0.25	0.25		
La Contenta STP	5+	0.065	0.065	.065A			1	ı		
*Pardee Center WTP	2	0.003	0.002	.002A	r	4	4			
West Pt WWF	7	0.058	0.04	,	0.04	•	1	1		
Camanche S Shore WTP	7	0.082	0.082	. •	0.082	1.5	1.5	1	•	
San Andreas SD	7	0.4	0.25	1	0.15	'n	λO	λ		
COLUSA							:	:		
Maxwell Rdside Rest	7	0.001	0.001	i	0.001	4:	4	4		
* Auburn Labe Traile	•	0.015	0.015		0.015	1	1	1		
FRESNO	•									
*Hume Lk Christian Camps	s 2	0.1	0.1	,	0.1	33	ť	0.0		
Lassen Ave. Rdside Rest	0	0.02	0.001	•	0.001		· · · · · · · · · · · · · · · · · · ·	i		
Biola	2	0.1	0.05	•	0.05	3.5	3.5	7.5		
San Joaquin WWTP	0	0.25	0.25	•	0.25	7	7	S	• 70	
GLENN					•			.(•		
Willows Rdside Rest		0.001	0.001	1	0.00		1	7:1		
Lake Isabella WWF	7	0.03	0.03	•	0.03		ı	,		
KINGS										
Stratford 1 A S S F N		0.15	0.09	1	0.09	7	4	23		
#I accen Co Water Works		0.1	0.03	٠	0.03	15	15	21		
MADERA		;								
Camp Sugar	0	0.03	0.03	1	0.03	0.5	0.5			
MARIPOSA						2				
Mariposa Pines		0.053	0.01	•	0.01	, ,	- ;	i		
Don Pedro	2	0.065	0.015	.015L	1 . 	0.1	0.1			
Yosemite West		0.1	0.026	1	0.026	0.25	0.25	i		
Coulterville	-	0.3	0.025	ı	0.025	9.0	9.0	1		
NEVADA										

Appendix 13. Tabulation of Responses to Water Reclamation Facility Questionnaire

		Design	Current				Ponds Used	Ponds Used Available Land	
	Treatment	Flow	Flow	Reuse	Available	Ponds	By Wildlife	For Habitat	
County/ Facility	Level	(MGD)	(MGD)	(MGD)	(MGD)	(ACRES)	(ACRES)	(ACRES)	Notes
Cascade Shores	0	0.02	0.05		0.02	-		ı	
Grass Valley Group	7	0.1	0.025		0.025	1.2	1.2	,	
Penn Valley WWTP	۱ ،	000	0.032		0.032		1	7	
PLACER	1	0.0	7000	•	7000	2		C	
Newcastle	c	800	80.0	1	80 0	7	1.5		
	1 6	0.00	0.00	1	0.00];	: :		
Collax	7	0.16	0.14		0.14	Ξ	=	1	
PLUMAS									
CSA #8	2	0.001	0.001		0.001		ı	1	
Beckworth	7	0.001	0.001		0.001	•	,	,	
Taylorsville	0	0.001	0.001	,	0.001		1		
SAN JOAQUIN	,							,a	
Woodbridge	1	0.3	0.3	,	0.3	12	12	1	
SHASTA									
Whiskeytown Unit	7	0.007	0.007		0.007	1	,	,	
Burney CWD	7	0.44	0.44	,	0.44	15	15	1	
SISKIYOU									
McCloud CSD	2	0.3	0.21	1	0.21	10	10	1	
STANISLAUS									•
Modesto/Woodward Res	2	0.01	0.01	J	0.01	5	33	10	
TULARE									
*Porterville KOA	2	0.015	0.01	ı	0.01	4.5	4.5	1	Has waterfowl now
Delft Colony WWTF	_	0.043	0.043	•	0.043	6.5	6.5	1	
Springville PUD		90.0	0.045		0.045	0.7	0.7	,	
Terra Bella SMD	1	0.2	0.2	•	0.2	9	9		
TUOLOMNE									
*Leland Meadow	Э	0.002	0.002	1	0.002	æ	εn	ŀ	Has 5 acres by lake
IOLO		:	;						
*D-Q University	7	0.001	0.001	,	0.001	1.5	1.5	20	15-20 acres in planning
Davis Migrant Housing	2	0.034	0.034	į	0.01	-	-	•	
Subtotal:		4.34	3.15	0.434	3.07	221	203	135.45	
Design Capacity >0.5 MGD	ť								
AMADOR		-							
Jackson	2	0.71	0.4		0.4		1	ı	Discharge Jackson Creek
River Pines	2	3.5	0.02	.02H	•	7	2	1	
Preston	2	3.5	0.36	.2M	0.16		1	20	
BUTTE									
Biggs	2	0.53	0.16		0.16	4.8	4.8	,	Discharge to Hamilton Slough
Chico	2	9	4.8	,	4.8	•	ı	•	Discharge Sacramento River
*Oroville	2	6.5	3.1	1	3.1	ı	•	1	Discharge Feather River

Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

		Design	Current				Ponds Used	Ponds Used Available Land	
Country Booilsty	Treatment	Flow	Flow	Reuse	Available	Ponds (ACRES)	By Wildlife	For Habitat (ACRES)	Notes
County) racuity	10.40	(GDIII)	(TOWN)	(GOUL)	(22211)	722222	(2000)		
Murphy's	,	1.08	0.2	.13A	0.07	15	12	ı	
COLUSA									
*Williams	2	0.5	0.35		0.35	,		ı	Discharge to Salt Creek
City of Colusa	2	6.0	0.5	ı	0.5	55	55	•	
CONTRA COSTA									
*Oakley - Bethel	2	1.5	1.5	1.5A		62	62	2700	
FL DORADO									
Hangtown	2	3.9	0.95	ı	0.95	1	t	•	Discharge Hangtown Creek
FRESNO						!	. 1		
Parlier	7	, —	-	0.5A	0.5	15	15	ı	
Kerman	7	1.2	9.0	1	9.0	6	6	10	
Mendota	1	1.2	-	ΙΑ		7	7	1	
Recelley	7	2.83	2.7	2.7GW		70	20	1	Discharge Kings River
Sanger	2	3.3	3.3	3.3A	٠	15	15	1	
City of Bresno		09	55	55A	ı	1000	1000	t	
CILED IN CITE OF THE CITE OF T	1	3	}						
VINCIO*	·	, 1	0.864		0.864	40	40	,	
Natio.	7	1.7	1000		5	}	₽		
The I		5 0	0.22	0.184	0.04	10	ċř	30	
relection	٠, ٦	, ,	77.0	0.70	5	165	, <u>c</u>	£ 5	
l enachapi	7 (7.5	. 6	V./.	700		14 5	3	
Minterfield	2	0.75	0.75		0.75	14.5	14.5	20	
Taft	2	1.2	0.9	0.5A	38.5	7.5	7	ı	
Shafter	2	1.86	0.89	0.89A	1	6	6	,	
Wasco	2	1.95	1.5	1.5A		20	70	•	
Delano	7	4.4	3	3A	•	130	130		Land Disposal
N River SD	2	9	3.2	3.2A	1	160	40	1	
Mt. Vernon	7	9.9	3.5	2.9A	9.0	2.5	1	1000	
KINGS									
Lemoore-Naval	7	4	1.5	.01A	1.496	429	429	100	
LAKE									
*Stonehouse	(2+)	[0.89]	[0.89]	[0.89L]	工	[32]		_	PROPOSED
Clearlake	2	0.5	0.3		0.3	17.5	17.5	·	
Lakeport	7	9.0	0.5	0.5A	1	25	25	400	
NW Regional	7	2	0.87	0.87A	1	40	40	1450	
MERCED									
*Santa Nella	. 2	0.45	0.2	0.2A		=	11	•	
*Dos Palos		0.54	0.5	•	0.5	•		300	Discharge to Colony Branch 2
*Gustine	2	1.2	-	HI	,		65	700	Discharge Los Banos Creek
Los Banos	7	5	7	2A	1	300	300	ı	
*City of Merced	7	10	7.3	1.4H	ν,	400	400	200	Discharge to Hartley Slough
MODOC) ,
* Almera	0	0.5	5.0	1	0.5	ı	ı	v	Discharge Pit River
כמוחוונו	ì	})		;			1	

Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

		Design	Current				Ponds Used	Ponds Used Available Land	
	Treatment	Flow	Flow	Reuse	Available	Ponds	By Wildlife	For Habitat	
County/ Facility	Level	(MGD)	(MGD)	(MGD)	(MGD)	(ACRES)	(ACRES)	(ACRES)	Notes
NEVADA									
CSD #1	2+	0.72	0.33	0.17A	0.16	15	15	20	
Nevada City	3	0.95	0.4	,	0.14	ı	1	1	Discharge to stream
Grass Valley	2+	3.8	1.8	•	1.8	•	1	1	Discharge to Wolf Creek
PLACER									
*Lincoln	7	0.7	0.7	1	0.7	55	40	20	
Aubum	2	1.23	1.2	1	1.2	17	17	1200	Discharge Auburn Ravine
*Roseville	3	11.75	8.5	•	8.5	,	ſ	ı	Discharge Sacramento Watershed
PLUMAS									
Quincy #1	2	0.5	0.5	0.5A	1	5.2	5.2	ς.	Discharge Spanish Creek
Chester	2	0.75	0.5	1	0.5	16	16	ı	Discharge Lake Almanor
Quincy #2	2	2.5	1.5	.25A	,	1		1	
SACRAMENTO									
Walnut Grove	2	0.5	0.16	,	0.16	27	27	ı	Discharge Snodgrass Slough
Rancho Murieta	2	2.4	2.4	2.4L	ı	. 1	ı	,	
*Sac Regional	7	181	160	HI	160	70	20	200	Discharge Sacramento River
SAN JOAQUIN									
Manteca	2	5.45	4.5	3 A	1.5	10	10	ı	Discharge San Joaquin River
Lodi	2	6.2	6.2	3.3A	2.9	40	30	ı	Delta Outfall
*Tracy	2	6	4.5	1	4.5	110	110	2000	Discharge to Old River
Stockton	3	58	37	2M	35	620	620	620	Discharge San Joaquin River
SIIASTA									•
*Shasta Dam	2	-		.5A, .5M		10	10	45	Discharge Churn Creek
Fall River Mills	2	0.726	0.07		0.07	40	40	12	i
Anderson	33	1.4	1.4	1	1.4	-	-	ı	Discharge Sacramento River
*Redding	2+	∞	2	.02M	1.98	5	Ŋ	75	Discharge Sacramento River
*Redding	2+	∞	∞	M80.	7.92	5	2	75	Discharge Sacramento River
SISKIYOU									
Mt Shasta	2+	0.7	0.7	.007L	0.693	6	6	1	
SOLANO								,	
Dixon Canning	1	7.6	33	3A	•	-		300	3.0 MGD for 80 days
Dixon	2	-		1		100	100	40	
Rio Vista	, -	9.0	0.4	ı	0.4	ı	1	300	
STANISLAUS									
Hughson	2	0.5	0.5	.5A	,	32	32	1	Maintain Nesting Ponds
Oakdale	2	1.5	1.5	,	1.5	7	ı	110	
Patterson	2	0.75	0.75	•	0.75	4	20		
Newman	2	1.1	1.1	1.1A		99	8	170	
Salida	7	2.29	0.36	36A	•	16	1	•	
Turlock	8	15.5	6	•	6		ı		Discharge San Joaquin River
Modesto	2	27	27	V 6	18	1000	1000	1000	Discharge San Joaquin River
SUTTER							!		
Live Oak	2			•	1	19	15	ı	Discharge to KD / / / ditch

Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

		Design	Current				Ponds Used	Ponds Used Available Land	
T	Treatment	Flow	Flow	Reuse	Available	Ponds	By Wildlife	For Habitat	
County/ Facility	Level	(MGD)	(MGD)	(MGD)	(MGD)	(ACRES)	(ACRES)	(ACRES)	Notes
TEHAMA		,							
Corning	2	0.83	0.83	ı	0.83	ı		ţ	Discharge Sacramento River
TUSD	. 6	0.84	0.04		0.04	ς	5	1	
Dad Bluff	· 4	23	.1.3	1	1.3	1		,	Discharge Sacramento River
TIII ABE	- 4	ì							
*Ecolomic **	·	90	90	1	9.0	30	30	1	
	1 6		; -	1.1GW	1	40	10	,a	
Lindsay	٠, ١	1:1)	0	, c	30	,	
Farmersville		1.25	8.0	,		3 8	3 8	، د	
*Dinuba	7	ED.	1.6	1A, .6GW		3	ટ્ર	30	
Tulare	7	9.39	5.8	5.5A;5GW	,	176	176	006	
Visalia	2	12.5	10.5	10.5	1	100	100	006	Discharge Mill Creek
THOLUMNE									
Sonora	2+	2.6	1.4	1.4A	1	1	,i	ı	
Olox									
Winters	2	0.7	0.7	ı	0.7	78	28	,	
CJI	5+	4.2	1.8	1	1.8	'n	5.	1	Discharge to Putah Creed
* C *	2 + 6	٧.	v	ı	v	120	120	345	Discharge to Willow Slough
Cavis	ī, c	, ני ער	30.4	W100	01/01/01	1	,	ı	Discharge Sacramento River
West Sacramento	7	?	4.4	.001100	+4.47				0
Wheelerd	c	8 0	0.0	ı	0.5	:641	_	æ	
Wneauand	4 C		7 -	•		37	25	25	Discharge Yuba/Feather River
*Marysville	4 (: ·] -	31			} '	1 05	Discharge Hutchison Creek
*Beale	7	٦	-	J.	š	ז		9	0
Subotal		572	433	132	304	6030	5570	19030	
))	1						
Total Interested:		576	436	132	307	6250	5770	19170	
10tal Interested.		5	1	1					
FACILITIES NOT INTERESTED	Q								
Design Capacity< 0.5 MGD									
ALLINE Canteel ake	c	0.00	0.004	•	0.004		1		
Bear Vallev	2	0.1	0.08	.08L	0.08	0.5	0.5		
AMADOR									
Pine Grove	0	0.015	0.015	1	0.015	7	2		
Ione	2	0.35	0.35	- I	0.35	10	10		
Plymoth	7	0.25	0.25	.25A	F .	30	al"		
BUTTE					. 1				
Stirling	0	0.01	0.01		0.01	1	1		
Butte Co. #21 Ponds	0	0.002	0.002	1	0.002	•	ı		
Butte Co. #21 Rocky Bluff	0	0.013	0.013	1	0.013	1 3	ı		
Chico Airport	2	0.25	0.25		0.25	2	•		
					ļ	ļ			

Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

		Design	Current	ı	:		Ponds Used	Ponds Used Available Land		
	Treatment	Flow	Flow	Reuse	Available	Fonds (ACPES)	By Wildlife	For Habitat	Notes	
County/ Facility	Level	(MCD)	(MQD)	(IMIOID)	(MOIM)	(ACINES)	(CTVICAL)	(Game)		
Richvalc	7	0.25	0.001	•	0.001	5	Ŋ			
Golden Feather	7	0.015	0.015	.015GW	•	•	ı			
Mountain View	0	0.001	0.001	,	0.001		ı			
Youth w/a Mission	- 2	0.035	0.035	,	0.035	_	-			
CALAVERAS										
Timber Trail	, -	0.001	0.001		0.001	i	1			
Co. WD La Contenta	7	0.065	0.065	.065L	ı	promp	ı			
Mokelumne Hill	2	0.045	0.045	1	0.045	•	ı			
Co Faireround	· ~	0.001	0.001	•	0.001		1			
Wilseyville	· ~	0.006	0.006	,	9000	(1)				
Winsey vine	-	0.007	0.007	1	0.007		1			
Dig 11003 FRMID Pardee	- 2	0.003	0.002	.002A	1	4	4			
*(Indian Rock)	1	[900]	[900]		[900]				PROPOSED	
Big Trees [Co. Homes]		0.007	0.003	; •	0.003	•	1			
Southworth Ranch	'n	0.017	0.001	•	0.001	-	,			
Forest Meadows	2	0.045	0.035	1	0.035	_	ı			
Valley Springs	2	0.065	0.065	.065A	1	65	65			
Vancy Springs Donales Elet	0	0.065	0.04	. 1	0.04	1	ı			
Mill Woods	ı	0.088	0.002	1	0.002	ı	ı			
Amold	יני	0.175	0.07	,	0.07	1	ı			
5	, ,	0.27	0.065	,	0.065	7	1			
Copper Cove	٠, ١	4.0	000	۲.	0.12	\ \	v			
	7	0.35	0.22	Υ.	0.12	ר	1			
			,		Č				Ditch discharge	
Maxwell PUD	2	0.2	0.07	1	0.07	٥	٥	¥	Ditch discharge	
EL DORADO						•	(
Rancho Pondeosa	2	0.03	0.03	'n	0.03	7	7			
Gold Ridge	0	0.001	0.001	1	0.001		1			
Growlersburg	2	0.015	0.015	ı.	0.015	2	7			
Harris Farms housing	7	0.02	0.05		0.02	-	-			
Millerton Lake	2	0.0225	0.001	•	0.001	0.1	1 .		٠	
Harris Farms Rest	2	0.065	0.04	•	0.04	1.5	1.5			
Millerton Lake	0	0.005	0.002	•	0.002	_				
Rig Creek	0	0.005	0.005	,	0.005	1	1			
Tamarack Estates		0.008	0.008	•	0.008		1			
Miramonte CC	7	0.015	0.015	•	0.015	7	7			
Shaver Springs	1	0.034	0.034	٠	0.034	0.5	•			
El Porvenir	1	0.05	0.05	•	0.05	•	i			
Cantua Creek	,	0.061	0.061	1	0.061	•	ı			
WW Dist #38	-	0.094	0.094	•	0.094	1	1			
SD #34 Millerton	0	0.112	0.112	•	0.112		1			
Tranquility	_	0.12	0.12	1	0.12	10	1			
CD #24 Description	·	0.15	0.15	•	0.15	1			A.	

Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

	;	Notes																																	i.									
Ponds Used Available Land	For Habitat	(ACRES)																																										
Ponds Used	By Wildlife	(ACRES)	1	6	ı				1	1	٠	•	1	•		,	•	* 1	0.5		0.5	3.5		ı	¥ 0		'n	י ככ	20.2	•	, ç	23	ı		1		, (C	52.4	4	· 1	•	10	•	i
	Ponds	(ACRES)	3	6	∞		_	t	_	1		1	$i_{n}^{f^{+}}$	•	1	-		•	0.5		_	3.5		1	· v	۲.	n	' '	20.5	,	, ,	07	ı			ı		32.4	4	·	6.5	10		f
	Available	(MGD)	0.12	0.25	0.3	0.1	0.35		0.015	,	0.022	0.001	0.001	0.001	0.025	•	0.01	0.06	0.07	0.09		0.08		0.22	000	0.001	0.013	0.001	0.26	0.03	0.00	0.0	000	0.015	0.00	5000	0.008	0.021	0.028	1	0.09	0.25		0.0045
	Reuse	(MGD)			•	4	1		•	A200.		•	•	, 1		.03A	1	•	•	•	.026A	•		t		•		•	•		i				•			.01L	. !	.05L	ľ	1		
Current	Flow	(MGD)	0.12	0.25	0.3	0.1	0.35		0.015	0.007	0.022	0.001	0.001	0.001	0.025	0.03	0.01	0.06	0.07	60.0	0.026	0.08		0.22	,000	0.001	0.015	0.001	0.26	000	0.03	0.3	000	2000	0.013	40.00	0.008	0.031	0.028	0.05	0.09	0.25		0.0045
Decian	Flow	(MGD)	0.2	0.25	0.3	0.37	0.4		0.015	0.007	0.00	0.001	0.001	0.001	0.025	0.04	0.05	90.0	0.07	0.2	90.0	0.2		0.22	0	0.001	0.015	0.001	0.26	ç	0.03	0.3	000	600.0	0.022	0.03	0.03	0.031	0.038	0.085	0.1	0.25		0.0045
	Treatment	Level	2		7	2	-		0	c	- c	- 0	0	0	0	m	2	-	εij		2	0		7		7	7	2		ć	0	7		٠ د	7	7	7	7	7	2	2	2		0
		County/ Facility	I alon	Riverdalc	Del Rev	Caruther	Parlier East	GLENN	Alder Springs	KERN Line Tolor	ron tejon	I Cjon Kancii	CSA #71	CSI :::	Olcese Dist #4	Reeder Tract	Erskine Creek	CSA #39	Olcese WWTP	Lost Hills	Pirelli	Maricopa	KINGS	Kettleman City	LAKE	Capitol Age Enlighten.	Konocti	Los Brez	Kelseyville	LASSEN	Bench Resort	Westwood	MADERA	Hensicy Lake	Teaford Meadow	Lake Shore	Marina View	Chuk Chanse	North Fork	Gold Side	Parkwood	Oakhurst	MARIPOSA	Badger Pass

Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

							Ponds Usca	Ponds Used Available Land	
	Treatment	Flow	Flow	Rense	Available	Ponds	By Wildlife	For Habitat	•
County/ Facility	Level	(MGD)	(MGD)	(MGD)	(MGD)	(ACRES)	(ACRES)	(ACRES)	Notes
Mt Bullion	0	0.015	0.015	,	0.015	0.5	ı		
Horseshoe Bend	7	0.04	0.04		0.04	1	,		
Glacier Pt.	0	0.05	0.005	1	0.005	•	ı		
McClure	2	0.052	0.052		0.052	t	ı		
Ваттет Соме	2	0.076	0.076		0.076	•	,		
Wawona WWTP	'n	0.3	0.3	.3L	1	r	1		
McSwain Rec Area	2	0.15	0.15	,	0.15	-	1		
MERCED									
San Luis Pump	0	0.004	0.002	,	0.002	0.25	0.25		
Le Grand	_	0.15	0.15	.1A	0.05	10	10		
Snelling	2	0.3	90.0	.06A	•		1		
Franklin	,	0.4	0.3	· I	0.3	30	•		
MODOC							,		
Devils Garden	2	0.015	0.015		0.015	7	7		
Adin	2	0.055	0.018	,	0.018	'n	ς.		
Calpines	7	0.1	0.003	1	0.003	3.5	3.5		÷
NAPA									
Berryessa Marina	ı	0.001	0.001	1	0.001	1	ı		
Markley Cove	0	0.001	0.001	ı	0.001	0.3	1		
Lake Berryessa	0	0.001	0.001		0.001		t		
Napa-Berryessa	7	0.2	0.03	•	0.03	7	7		
NEVADA									
Englebright Marina	ı	0.001	0.001	ı	0.001	0.25	ı		
Rollins Res.	2	0.003	0.003	.003L	ı	,	-		
Scotts Flat	2	0.003	0.003	.003L	1	_	-		
Washington Ridge	2	0.015	0.015	1	0.015	2	7		
N. San Juan	0	0.024	0.009	•	0.009	1	,		
PLACER									
Heather Glenn	0	0.02	0.02	•	0.05	•	ı		
Arca #24	2	0.012	0.012	ı	0.012	m	1		
Granite Bay	0	0.001	0.001	1	0.001	,			
Gold Run Res.	2	0.001	0.001	1	0.001	7	2		
Whitmore	0	0.001	0.001	1	0.001	0.5	• 1		
Area #28	2	0.04	0.04	.03A	0.01	7	7		
Sabre City	2	0.045	0.035	ı	0.035	9.0	9.0		
PLUMAS									
Gracagle	0	0.03	0.03	1	0.03	•	1.		
Arca #2	0	0.001	0.001	,	0.001	,	r		
Area #8	2	0.001	0.001	í	0.001	ı	1		
Plumas-Eureka	0	0.001	0.001	•	0.001	ı	1		
Frenchman	•	0.001	0.001	ı	0.001	•	•		
Greenville	2	0.4	0.114		0.114	70	70		
SACRAMENTO									,

Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

t 1 0.14 0.14 2 0.001 0.001 2 0.001 0.001 2 0.001 0.001 2 0.001 0.001 2 0.22 0.22 2 0.33 0.23 3 0.003 ck 0 0.001 0.001 ch 0 0.001 0.001 cet 0 0.001 c	Flow Flow (MGD)	se Available D) (MGD)	Ponds (ACRES)	By Wildlife (ACRES)	For Habitat (ACRES)	Notes
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Appendix 13. Tabulation of Responses to Water Reclamation Facility Questionnaire

		Design	Current				Ponds Used	Ponds Used Available Land	
•	Treatment	Flow	Flow	Reuse	Available		By Wildlife	For Habitat	Notes
County/ Facility	Level	(MGD)	(MGD)	(MGD)	(MGD)	(ACKES)	(ACKES)	(ACRES)	50001
Lemon Cove	-	0.02	0.01	•	0.01	_	1		
Gramt Grove	7	0.085	90.0	.03M	0.03	1	1		
Woodville Farm	_	0.2	0.2	,	0.2	10	1		
Linnel Farm	2	0.25	0.25	,	0.25	10	1		
Pixlev	2	0.2	0.2	.2A	•	4	ı		
Richerove	2	0.22	0.15	.15A	1	3	1		
Woodville PUD	7	0.33	0.08		0.08	•	ı		
Strathmore PUD	- 7	0.4	0.32	.15A	0.17	9	1		
Tipton	7	0.44	0.44	.3A	0.14	10	10		
TUOLUMNE									
Don Pedre Houseboats	2	0.07	0.07		0.07	1	1		
Tuolumne City	,	0.065	0.065	.065A	•	16	16		
Pine Crest	7	0.082	0.082	,	0.082	7.6	7.6		
Sierra CC	- 2	0.01	0.01	.01A	•	1	1		
Whitewolf	2	0.012	0.007	•	0.007	1.5	1.5		
Doorio Elat		0.016	0.016	1	0.016	0.5	0.5		
Hodadon Mandow	, ,	0.025	0.015		0.015	_	-		
Mi Wirk Willege	4 C	0.03	0.019	ı	0.019	•	ı		
Transmission Mandana	, ,	- C	0.1	,	0.1	5.4	5.4		
I noturine incarows	4 C	0.15	0.15	151	1	9.6	9.6		
Groveland	7	2.5	0.10			2			ł
YOLU	c	1000	1000		0.001	v	v		
Bill and Kathy's	7 0	1000	0.00	•	1000) '		
Knights Landing	0	0.00	0.001	ı	0.001		. 0		
Esparto	-	0.16	0.16	ı	0.16	<u>, ix</u>	0 (
UCD Primate	2	0.04	0.04	1	0.04	7	7		
		1	10.65	67 6	60.8	0 085	77 75		
Subtotal:		14.55	10.65	7.03	9.07	207.7	2		
Design Capacity > 0.5 MGD									
AMADOR									
Mule Ck State Prison	7	2.2	0.625	.625 A	1	10	10		
BUTTE									
Gridley	2	0.785	0.785	.785 GW	-	m	1		
COLUSA	,	1	0		or c	r			
Arbuckle	,	0.5	0.28		0.78	- 6	; c		
CONTRA COSTA					,	2.3	2.3		Discharge Old Biner
Discovery Bay	7	1.2	1.2	i ⁱ	1.2	5.3	14		Discharge Old Mive
Brentwood	_	1.8	0.0	•	0.9	4 6			
EL DORADO				,		07.0	07		
EID-El Dorado Hills	-	2.4	1.2	.2 M, 1L		25	ı		Joseph 2000 100 100 100 100 100 100 100 100 10
EID-Deer Ck WWTP	7	7	1.7	ı	1.7		•		Discharge Carson Creek
FRESNO						1			2

Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

County/Petility Treatment Modes Founty/Petility From State (MCR) Modes From State (MCR) Modes Modes Coulings School Purm 1. cot 0.65 0.65 6.65 6.65 6.67 6.67 6.67 6.67 6.67 6.67 6.67 6.67 6.67 6.67 6.68 6.67 6.68 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 6.69 7.7 7.7 <			Design	Current				Ponds Used	Ponds Used Available Land	
ool Furm	:	Treatment	Flow	Flow	Reuse	Available	Ponds	By Wildlife	For Habitat	Notes
nga School Furm 0.65 0.65 0.65 0.65 0.67 0.10 nage School Furm 2 0.53 0.69 0.65 3.0 3.0 7.8 ningat 1 0.63 0.63 0.64 0.65 3.0 3.0 3.0 non Cover 2 1.46 0.1 0.7 0.7 3.0 2.0 3.0 2.0 3.0 2.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	County/ Facility	Level	(MGD)	(MGD)	(MCD)	(MCD)	(ACKES)	(ACKES)	(ACKES)	IAGIES
anight 2 0.5 0.3 3.A 1 7.8 ning 1 0.93 0.69 6.69A - 10 7.8 ning 1 0.93 0.69 0.69A - 10 7.8 ge Cove 2 1 0.7 0.65 0.6 0.6 0.6 0.6 ga 2 1.65 0.7 0.7 3.0 2.2 3.0 3.0 ga Piccoc 2 1.65 0.7 0.7 3.0 2.2 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	Coalinga School Farm	ı	0.65	0.65	A 29.	1	_	10		
nigation of the control of the contr	Firebaugh	7	0.5	0.3	.3 A	t	10	78		
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gg Cove 2 1 1 1 0.5A 0.5 60 re Lake 2 1.46 0.1 - 0.1 30 re Lake 2 1.46 0.1 - 0.1 30 32 RCSD 2 8 2.47 2.47A 32 I 165 0.2	Huron	_		0.65	1	0.65	30	20		
gg et core. 2 1.46 0.1 - 0.1 30 - 1 Itin 2 1.55 0.7 - 0.7 30 32 Itin 3 0 32 Itin 4 0 0 33 Itin 3 0 32 Itin 4 0 0 33 Itin 3 0 32 Itin 4 0 0 33 Itin 3 0 32 Itin 4 0 0 33 Itin 3 0 32 Itin 4 0 0 33 Itin 3 0 33 Itin 3 0 0 33 Itin 4 0 0 0 33 Itin 3 0	Oranga Coue	, ,		-	0.5A	0.5	9	,		•
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ggs	Shaver Lake	7	1.40	0.1	ı	7.1	200	' {		
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Illon	S-K-F CSD	2	œ	2.47	2.47A	,	32			
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ardand 2 0.6 0.6 0.6A 10 10 10 10 10 10 10 10 10 10 10 10 10	***************************************	3 C	1 12	1 13	1	1 12	17			Discharge Logan Creek
ardand 2 0.6 0.6 0.6 - 10 - 10 - 10 - 10 - 10 - 11 0 - 11 0 0.5 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8	+ W.IIIOWS	4	71.1	71.1		71.17	:			Comment of the comment
udand 2 0.6 0.6A - 10 - on Springs 2 0.5 0.5 0.05 0.75 (0.025) 1 - o State Prison 2 1 0.75 0.75GW - 4.75 - nt 2 4.1 1.4 1.4A - 31 31 nt 2 4.1 1.4 1.4A - 31 31 nt 2 4.1 1.4 1.4A - 31 31 nt 2 4.1 1.4 1.4A - 640 640 nt 2 3.5 2.5 2.A - 640 640 nt 2 1.45 1.2 0.6A 0.6 73 33 nt 2 1.45 1.2 0.6A 0.6 73 35 nt 2 2.2 2.A 2.A 3.5 35 nt 3	CERN									
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o State Prison 2 1 0.75 0.75GW - Interfield 2 35 25 25A - 640 640 640 640 640 640 640 640 640 640	Arvin		80	80	0.8A	•	4.75	ı)
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al 1 14 144 144 151 151 151 151 151 151 15	Wasco State Libon	1 (- ;) ,			ŗ	;		
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At the control of the	Chowchilla	7	7	0.69	0.1A	0.59	30	25		
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13 0.75 0.04 0.02M 0.02	Nevada Co. SD#1	2+	1.12	0.39	- i	0.39	1	1		Stream Discharge
3 0.75 0.04 0.02M 0.02	PLACER									1
3 1,2 1.2 0.02M 1 -	SMD #3	cŕ	0.75	0.04	M200	0.02		ı		Miners Ravine
3 1.2 1.2 U.OZIM 1 -	SHICH STATE	กัต	7.7	5 .	71000	70.0				Charles Indiana
	SMD #1	ń	1.7	1.7	0.02M	-	ı	1		Stream Discharge

Appendix E. Tabulation of Responses to Water Reclamation Facility Questionnaire

		Design	Current				Ponds Used	Ponds Used Available Land	
	Treatment	Flow	Flow		Available		By Wildlife	(ACPES)	Notes
County/ Facility	Level	(MGD)	(MGD)	(MGD)	(MGD)	(ACKES)	(ACKES)	(ACNLO)	
CACOANGNITO									5
ACINIMIZATIO	,	35.8	35.8	,	35.8	137	137		Bullalo Creek
Aerojet	C	-	-	1A	•	22	22		Laguna Creek
Gall Darie Sano	1 (14.4	12.3	12.3A	,	7	1		
Kancho Seco	1	:							
SAN JOAQUIN	•	37.0	37.0		0.75	1	1		
Ripon		 	3 0		3 0	. 36	1		
Escalon		0.5	0.5	,) (
Deuel Voc. Institute	7	0.62	0.5	0.5L	1	7.7	ı		
SISKIYOU					(c	ŗ		Discharge Sacramento River
Dunsmuir	2	0.51	0.23	•	0.23	.n	n		
ONATOS									Di-Lange Cloudh
Vacavilla	2	10	5.2	0.2M	5	9.5	1		Discharge Cache Stough
Vacaville Industry	. 2	1.4	0.39	,	0.39	56	3 6		Discharge Gibson Ck. to Cache 31.
CT ANICI ANC	ŀ								
SIMISTAGS		2 5	2.5	1	2.5	113	50		
Kiverbank	- ,	1 .	i -	1 0 4	1	40	9		
Ceres	+	6:1	F. J.	1.9A	•	?	2		
SUTTER			•		•	9	9		
Yuba City	7	7	4.2	1	4.7	3	3		
TEHAMA			,		5				Discharge Sacramento River
Rio Alto	2+	0.64	0.03	0.02L	0.01	1	1		0
TULARE						•			*
Ivanhoe	1	0.56	0.26	0.26GW		10	1 ,		
Woodlake	7	_	9.0	0.6A	•	10	10		
H Courses	. 6	1.5	1.5	0.5A	-	10	ı		
Exelei	, ,	1.47	1.2	0.6A	9.0	6	6		
Cuuci-Orosa	1 (4	4	3A 1 GW	· >	1	ł		
Porterville	7	>	۲	;					
TUOLUMNE		1	(4 10 0		95	35		
Regional #2	-	0.5	0.25	0.23A	t	3	2		
YOLO	,	t	•			300	300		Discharge Tule Canal
Woodland	2	4./	4./	•	ř	2)		
YUBA			,		•		:		Ag Drain Discharge
Olivehurst	7	1.3	-	1	٠,	, \$			
Linda Co. WD	7	1.5	ç	ı	-	40	₽		
			1	;	ć	3130	1000		
Subtotal:	tal:	206	150	9	84	C/C7	1607		-
Total Not Interested:	:paj	220	161	689	2	3165	2526		
m r A II December Recilities.	Zocilities.	796	597	201	399	9415	8296		
I OTAL FOT ALL RESPONDENCE A	acillinos.								

* Facilities which have/had plans to enhance wildlife habitat Available = Current flow minus reuse

Appendix 13. Tabulation of Responses to Water Reclamation Facility Questionnaire

			Notes
Ponds Used Available Land		For Habitat	(ACRES)
Ponds Used		By Wildlife	(ACRES)
		Ponds	(ACRES)
		Available	(MGD)
		Reuse	(MGD)
Cument	Cultonia	Flow	(MGD)
Decion	ligis.	Flow	(MGD)
		Treatment	Level
			County/Facility

Treatment Levels: 1: Primary

2: Secondary3: Tertiary2+: Advanced Secondary

Reuse Abbreviations:

A: Agricultural GW: Groundwater Recharge H: Habitat

L: LandscapeM: Miscellaneous

APPENDIX H

State of California

Memorandum

To : Jeanne Chilcott

Central Valley Regional Board

Date: NOV 8 1991

Elizabeth Miller Jennings

Senior Staff Counsel
OFFICE OF THE CHIEF COUNSEL

From : STATE WATER RESOURCES CONTROL BOARD

Subject: LIABILITY OF OWNERS AND OPERATORS OF WATER AND SEWAGE FACILITIES

WHO USE RECLAIMED WATER TO CREATE WILDLIFE HABITAT

The purpose of this memorandum is to answer questions you posed regarding the potential legal implications of creating new wetlands through disposal of wastewater from water and sewage facilities. As I explained in our conversation, the issues posed are complicated and in some cases not settled law. Thus, my comments should be seen as preliminary, and may be subject to change should EPA or the courts clarify the issues.

Generally, wetlands may come within the definitions of "navigable waters" and "waters of the United States" if they meet the regulatory standards set forth in regulations adopted by the Environmental Protection Agency (EPA) at 40 Code of Federal Regulations (CFR) Section 122.2. If wetlands are thus designated as "waters of the United States" (and, therefore, "navigable waters"), then they are subject to protection under the federal Clean Water Act and any discharges thereto must be pursuant to a national pollutant discharges elimination system (NPDES) permit.

Wetlands which are considered "waters of the United States" include interstate wetlands (those crossing a state border), and wetlands whose use, degradation, or destruction could affect interstate commerce. Effects on interstate commerce are broadly defined to include any activities which could affect economic activities outside of California. These might include export of food products grown in the wetlands, persons coming from out-of-

state to fish, hunt or birdwatch, or use of the wetlands by industries which export products outside the state, etc.

Finally, even where wetlands do not affect interstate commerce, they are considered "waters of the United States" if they are adjacent to any navigable waters other than wetlands (including rivers, lakes, etc.). However, in this category, waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the Clean Water Act, are not waters of the United States.

The exclusion for waste treatment systems will, in general, be interpreted narrowly. In the Matter of Borden, Inc./Colonial Sugars (1984) NPDES Appeal No. 83-8. Also, the exemption is available only if it is determined that the wetland is not, itself, affecting interstate commerce. The exemption applies only to "manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the Unites States".

In your memorandum, you asked about the impact on the legal conclusion that the wetlands will be artificially created rather than natural. In general, the determination of whether a water body is "waters of the United States" will not turn on whether the water is artificial. <u>United States</u> v. <u>Ciampitti</u> (D.N.J. 1984) 583 F.Supp. 483 [Artificially-created wetland is water of the United States]. On the other hand, if it is contended that the wetland is simply a waste treatment system, and therefore exempt, it must be artificially created.

You have also asked whether a discharger could voluntarily cease a discharge to an artificially-created wetland, and whether this cessation would violate the Fish and Game Code. Cessation of a discharge does not violate the Porter-Cologne Act or the portions of the Clean Water Act which the Regional Board implements. However, it is beyond my expertise whether other laws, such as the Fish and Game Code, might be violated. I suggest you contact agencies which administer these other laws.

STATE WATER RESOURCES CONTROL BOARD

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SAN FRANCISCO BAY REGION (2)

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TRINITY

HUMBOLD

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SHASTA

BUTTE

TEHAMA

GLENN

ASSEN

PLUMAS

EL DORADO

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STATE OF CALIFORNIA Pete Wilson, Governor

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY James M. Strock, Secretary



